SOUTHERN PACIFIC STEAM LOCOMOTIVES

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With More Than 115 Illustrations

Compiled by Donald Duke

REVISED EDITION

The name Southern Pacific in the United States and throughout the world became synonymous with steam locomotives. A Southern Pacific locomotive personified in all minds the best in design, performance and style.

When the rails of the Central Pacific and Union Pacific wed in 1869, the pioneer days of the West came to a close. Southern Pacific rails spread across the West while the development of the steam locomotive was spurred ahead by ever-increasing demand for more efficient and heavier power.

(Continued on Back Flap)

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SOUTHERN PACIFIC STEAM LOCOMOTIVES

A Pictorial Anthology Of Western Railroading

COMPILED BY DONALD DUKE

Golden West Books

San Marino, California

SOUTHERN PACIFIC STEAM LOCOMOTIVES

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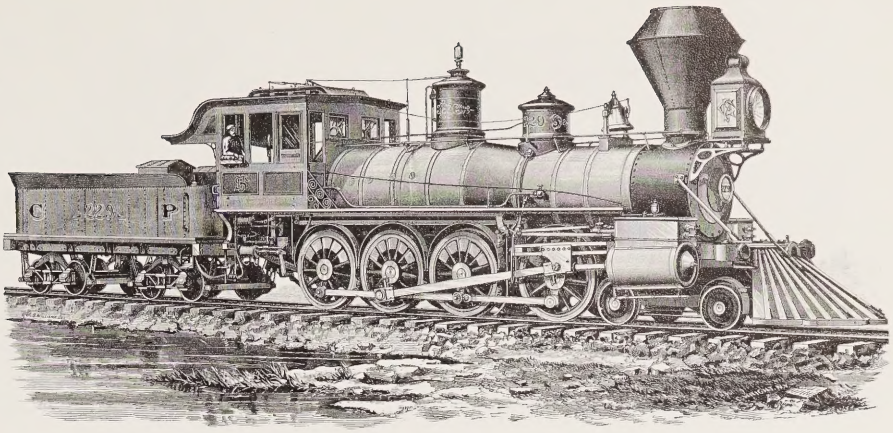


Preface

The great age of the steam locomotive is past. The development of a machine over the past 110 years is now a closed chapter in the history of motive power and transportation.

There was something about a steam locomotive that warmed the heart of every man. Perhaps it was the suggestion of latent power which it signified. Even when not in motion, one could stand by the hour watching it. Closing your eyes, you might imagine oneself in an asylum for demented noises. There were shrieks, throbs, and a hiss, while the air was distressed by escaping steam from every joint. Ponderous engines stood motionless, but the aroma of hot oil and grease held you spellbound. Maybe it was the speed and the sensation of traveling 80 miles an hour, or the stack talk from the head end that thrilled the spectator. It got into your blood and became a part of the American scene, just like the hamburger.

The name Southern Pacific, in the United States and throughout the world, became synonymous with steam locomotives. A Southern Pacific locomotive personified in all minds the best in design, performance and style, whether from the ranks of the Baldwin Locomotive Works or the Southern Pacific shops at Sacramento.

When the rails of the Central Pacific and Union Pacific were joined in Utah Territory in the spring of 1869, the pioneer days of the West drew to its official close. The Southern Pacific rails grew North and Southwest, while the development of steam locomotives was spurred continually by the ever-increasing demand for more efficient and heavier motive power.

Steam locomotives of the Southern Pacific were big, unique and different. Motive power rosters contained just about every type of wheel classification which rode American rails.

It should be emphasized that this volume by no means purports to be an exhaustive treatise on the steam locomotives of the Southern Pacific. Its purpose rather, is to show a representative collection of types as they came from the Baldwin Locomotive Works and other great American locomotive builders.

Fig. 81

Acknowledgements

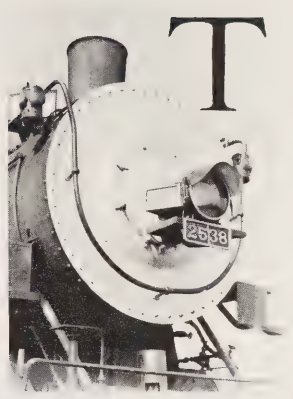
For much of the assistance I have had in gathering material, photographs and data for *Southern Pacific Steam Locomotives,* I wish to thank my many friends who opened up their collections so that others might share their historical wealth.

I am indebted to Mr. Robert King of the Southern Pacific Company—Public Relations staff, and to Mr. Ed Cheetham, Mr. Guy L. Dunscomb and Mr. Stan Kistler who were most helpful in aiding me in locating old photographic material. Mr. Gerald M. Best and D. L. Joslyn, authors of *Locomotives of the Southern Pacific,* provided photographs and information which assisted in bringing this 2nd edition current to the end of steam. A few of the builder's photographs of the Baldwin engines were furnished from the original Baldwin Locomotive Works files now in the collection of Mr. H. L. Broadbelt.

The major portion of this book comes from a periodical of the former Baldwin Locomotive Works under the title of *Baldwin Locomotives.* Inaugurated in 1922, this publication illustrated the newest types of steam locomotives as they were constructed at Baldwin and other American locomotive builders. Special kind thanks to the Baldwin-Lima-Hamilton Corporation for permission to reprint this material. Also thanks to Mr. P. E. Percy, retired from Baldwin-Lima-Hamilton, who spends many hours of his spare time at the plant searching the files for historical data and photographs for railroad buffs.

Lastly, I am grateful to Mr. Harlan T. Hiney for the cover illustration which depicts a memorable scene on the Southern Pacific iron trail. Although in his early twenties, Mr. Hiney is able to create a locomotive scene so realistically, one must touch the canvas to be sure.

Southern Pacific Steam Locomotives



THE immense engineering projects of today, employing the latest developments in machinery and power, tend at first sight to dim those monumental feats of construction accomplished by the pioneer railroad builders of this country who, without the assistance of steam shovels, high explosives and the like, marshalled together the few appliances then available and set out to build a "hand-made" railroad.

As late as 1862 California was, to all intents and purposes, isolated from the rest of the United States. The distance from New York to California by way of Cape Horn was more than the entire circumference of the globe on the latitude of San Francisco, while the other route across the fever-infested Isthmus was as long as a direct line from New York to Pekin. Travelling by Overland Stage between St. Joseph on the Missouri River and Placerville on the western slope of the Sierra Nevada Mountains took 17 days barring washouts, Indian raids and numerous other perils that beset the traveler.

Moved by the ever increasing necessity for a more adequate means of transcontinental transportation, not only to build up the West but also as a military measure, Congress in 1862 passed the Pacific Railroad Bill providing for "the construction of a railroad and telegraph line from the Missouri River to the Pacific Coast." This Bill was signed by President Lincoln on July 1, 1862. The Union Pacific Railroad, commonly referred to as the "Boston people," was to build west from a point on the Missouri River, and the Central Pacific to build east from San Francisco Bay or the navigable waters of the Sacramento River.

The Central Pacific Railroad of California, the parent Company of the present Southern Pacific Lines, had been organized the preceding year when Theodore D. Judah, a young civil engineer from Connecticut, had interested four Sacramento merchants in the possibility of building a railroad over the Sierra Nevada Range. These merchants, later to be known as the famous "Big Four" of California, were Collis P. Huntington and Mark Hopkins, dealers in hardware and miners' supplies; Charles Crocker, in the dry-goods business and Leland P. Stanford, then in the provision and grocery trade, although shortly to be Governor of California. Dynamic activity, tenacity of purpose and plain hard work characterized these men, although Huntington often remarked, "I do not work hard—I work easy."

The audacity of these men in undertaking such an enterprise seems remarkable. Their entire assets scarcely exceeded $100,000 and yet they were attempting the most difficult and expensive portion of the whole contemplated transcontinental railroad. To cross the Sierras demanded an ascent on the western slope of 7,000 feet in not more than 70 miles, and on the eastern side an equally difficult engineering feat in descending from the summit to Donner Lake where the tragic Donner Party of emigrants was snowbound during the winter of 1846-1847. How the building of the Central Pacific was financed through the sale of stock and the receipt of subsidies in bonds and land grants from the Government, is a story in itself. It will suffice to say that with the driving of the Golden Spike at Promontory Point, the construction expenditures had amounted to almost $90,000,000.

Ground was broken at Sacramento on January 8, 1863, and in the following August the sailing vessel *Herald of the Morning* docked at San Francisco with the first

CENTRAL PACIFIC RAILROAD

LOCOMOTIVE ENGINES

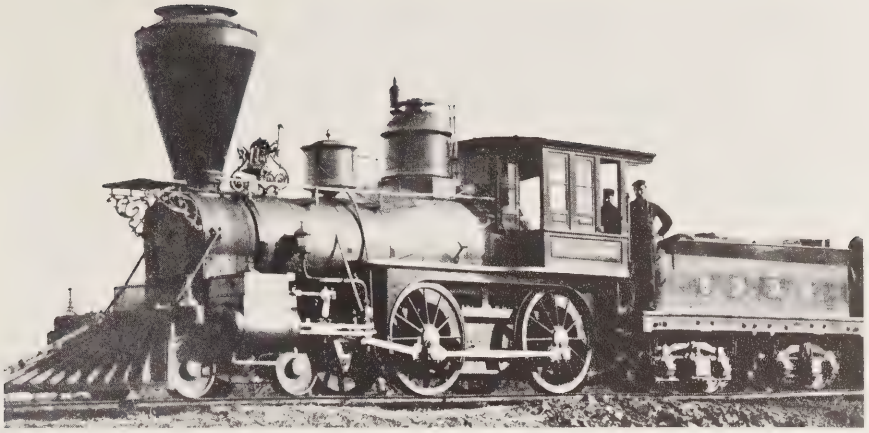
No.	Names	Makers	No. of Drivers	Diam. of Drivers	Diam. of Cylinders	Length of Stroke
				Feet	Inches	Inches
1	Gov. Stanford	R. Norris & Sons	4	4.6	15	22
2	Pacific	Mason Manufact'g Co.	4	5	16	24
3	C.P. Huntington	Danforth, Cooke & Co.	2	4.6	11	15
4	T. D. Judah	" " "	2	4.6	11	15
5	Atlantic	Mason Manufact'g Co.	4	5	15	22
6	Conness	" " "	6	4	17	24
7	Sargent	Booth & Co., S. F.	4	5	16	24
8	Nevada	Danforth, Cooke & Co.	6	4	18	22
9	Utah	" " "	6	4	18	22
10	Humboldt	" " "	6	4	18	22
11	Arctic	Mason Manufact'g Co.	4	5	15	22
12	Truckee	" " "	6	4	17	24
13	Hercules	Danforth, Cooke & Co.	6	4	18	22
14	Oneonta	" " "	6	4	18	22
15	Washoe	" " "	6	4	18	22
16	Owyhee	Mason Manufact'g Co.	6	4	17	24
17	Idaho	" " "	6	4	17	24
18	Piute	Danforth, Cooke & Co.	6	4	18	22
19	Carson	" " "	6	4	18	22
20	Amazon	McKay & Aldus	6	4.6	18	24
21	Tamaroo	" " "	6	4.6	18	24
22	Auburn	" "	6	4.6	18	24
23	Mono	" "	6	4.6	18	24
24	Montana	" "	6	4.6	18	24
25	Yuba	" "	6	4.6	18	24
26	Samson	Danforth, Cooke & Co.	6	3.9	17	22
27	Goliah	" " "	6	3.9	17	22
28	Gold Run	McKay & Aldus	4	5	16	24
29	Antelope	" "	4	5	16	24
30	Tahoe	R. Norris & Sons	4	5	16	22
31	Klamath	" "	4	5	16	22
32	Ajax	New Jersey Loco. Co.	6	4	16	24
33	Achilles	" " "	6	4	16	24
34	El Dorado	R. Norris & Sons	4	5.6	16	24
35	Boise	" "	4	5.6	16	24
36	Shoshone	" "	4	5	16	22
37	Mohave	" "	4	5	16	22
38	Ogdensburg	McKay & Aldus	6	4.6	18	24
39	Malone	" "	6	4.6	18	24
40	Solano	R. Norris & Sons	4	4.6	14	24
41	Stanislaus	" "	4	4.6	14	24
42	Tcolumne	" "	4	5	14	24
43	Tulare	" "	4	5	14	24
44	Colossus	McKay & Aldus	6	4.6	18	24
45	Majestic	" "	6	4.6	18	24
46	Unicorn	" "	6	4	17	22
47	Griffin	" "	6	4	17	22
48	Toiyabe	Grant Loco. Co.	6	4	17	22
49	Toquima	" "	6	4	17	22
50	Champion	McKay & Aldus	4	5	16	24
51	Climax	" "	4	5	16	24
52	Tip Top	" "	4	5	16	24
53	Summit	" "	4	5	16	24
54	Red Deer	" "	4	5	16	24
55	Black Deer	" "	4	5	16	24
56	Grizzly	Schenectady Loco. Wk's	6	4	18	24
57	Bison	" " "	6	4	18	24
58	Placer	" " "	6	4	18	24
59	Pluto	" " "	6	4	18	24
60	Jupiter	" " "	4	5	16	24
61	Storm	" " "	4	5	16	24
62	Whirlwind	Schenectady Loco. Wk's	4	5	16	24
63	Leviathan	" " "	4	5	16	24
64	Emigrant	McKay & Aldus	4	5	16	24
65	Mikado	" "	4	5	16	24
66	Tycoon	" "	4	5	16	24
67	Hector	" "	4	5	16	24
68	Peoquop	" "	6	4.6	18	24
69	Vulcan	" "	6	4.6	18	24
70	Saturn	" "	6	4.6	18	24
71	Vesuvius	" "	6	4.6	18	24
72	Niagara	Danforth Loco. Works.	6	4.6	18	24
73	Terrible	" " "	6	4.6	18	24
74	Dragon	" " "	6	4.6	18	24
75	Growler	" " "	6	4.6	18	24
76	Carrier	R. Island Loco. Works.	4	5	16	24
77	Confucius	" " "	4	5	16	24
78	Mars	" " "	4	5	16	24
79	Apollo	" " "	4	5	16	24
80	Phil Sheridan	Danforth Loco. Works.	4	5	16	24
81	U. S. Grant	" " "	4	5	16	24
82	Buffalo	Rogers Loco. Works	6	4.6	18	24
83	Mountaineer	" " "	6	4.6	18	24
84	Gazelle	Schenectady Loco. Wk's	4	5	16	24
85	White Bear	Rogers Loco. Works	6	4.6	18	24
86	Gorilla	" " "	6	4.6	18	24
87	Tempest	" " "	6	4.6	18	24
88	Hurricane	R. Island Loco. Works.	6	4.6	18	24
89	Giant	" " "	6	4.6	18	24
90	Gladiator	" " "	6	4.6	18	24
91	Tiger	" " "	6	4.6	18	24
92	Verdi	" " "	6	4.6	18	24
93	Oronoco	R. Norris & Sons	4	5	14	24
94	Eclipse	McKay & Aldus	4	5	15	24
95	Driver	" "	4	5	15	24
96	Clipper	" "	4	5	15	24
97	Racer	" "	4	5	15	24
98	Rattler	" "	4	5	15	24
99	Ranger	" "	4	5	15	24
100	Rover	" "	4	5	15	24
101	Hunter	" "	4	5	15	24
102	Runner	Rogers Loco. Works	4	4.8	15	22
103	Rusher	" " "	4	4.8	15	22
104	Rambler	" " "	4	4.8	15	22
105	Roller	" " "	4	4.8	15	22
106	Pacer	" " "	4	4.8	15	22
107	Courser	" " "	4	4.8	15	22
108	Stager	" " "	4	4.8	15	22
109	Flier	" " "	4	4.8	15	22
110	Fire Fly	" " "	4	4.8	15	22
111	Chamois	" " "	4	4.8	15	22
112	Hawk	Danforth Loco. Works.	4	4.8	15	22
113	Falcon	" " "	4	4.8	15	22
114	Heron	" " "	4	4.8	15	22
115	Eagle	" " "	4	4.8	15	22
116	White Eagle	" " "	4	4.8	15	22
117	Red Eagle	" " "	4	4.8	15	22
118	Grey Eagle	" " "	4	4.8	15	22
119	Golden Eagle	" " "	4	4.8	15	22
120	Bald Eagle	" " "	4	4.8	15	22
121	American Eagle	" " "	4	4.8	15	22
122	Willamette	Globe Works	4	5	16	24
123	Geo. L. Woods	Globe Works.	4	5	16	24
124	Umpqua	" "	4	5	16	24
125	J. R. Moores	" "	4	5	16	24
126	Swiftsure	McKay & Aldus	4	4.8	15	22
127	Mercury	" "	4	4.8	15	22
128	Herald	" "	4	4.8	15	22
129	Fleetfoot	" "	4	4.8	15	22
130	Favorite	" "	4	4.8	15	22
131	Greyhound	R. Island Loco. Works.	4	4.8	15	22
132	Deerhound	" " "	4	4.8	15	22
133	Foxhound	" " "	4	4.8	15	22
134	Trapper	" " "	4	4.8	15	22
135	Peeler	" " "	4	4.8	15	22
136	Swallow	" " "	4	5	16	24
137	Lark	" " "	4	5	16	24
138	Blue Bird	Schenectady Loco. Wk's	4	4.8	15	22
139	Blue Jay	" " "	4	4.8	15	22
140	Ostrich	" " "	4	4.8	15	22
141	Magpie	" " "	4	4.8	15	22
142	Raven	" " "	4	4.8	15	22
143	Swan	" " "	4	4.8	15	22
144	Crane	" " "	4	4.8	15	22
145	Dart	" " "	4	4.8	15	22
146	Arrow	" " "	4	4.8	15	22
147	Reindeer	" " "	4	4.8	15	22
148	Red Fox	" " "	4	5	16	24
149	Black Fox	" " "	4	5	16	24
150	Grey Fox	" " "	4	5	16	24
151	Yellow Fox	" " "	4	5	16	24
152	White Fox	" " "	4	5	16	24
153	Young America	R. Island Loco. Works.	4	5	16	24
154	Charmer	" " "	4	5	16	24
155	Sunbeam	" " "	4	5	16	24
156	Success	McKay & Aldus	4	5	16	24
157	Excelsior	" "	4	5	16	24
158	Eureka	" "	4	5	16	24
159	Diana	" "	4	5	16	24
160	Sultana	" "	4	5	16	24
161	Juno	" "	4	5	16	24
162	Flash	" "	4	5	16	24
163	Fancy	" "	4	5	16	24

WESTERN PACIFIC R. R. ENGINES

	Names	Makers	No. of Drivers	Diam. of Drivers	Diam. of Cylinders	Length of Stroke
				Feet	Inches	Inches
A	Sacramento	Wm. Mason	4	5	15	22
B	San Jose	" "	4	5	15	22
C	Stockton	Baldwin	4	5	14	22
D	Santa Clara	"	4	5	14	22
E	San Mateo	"	4	5	14	22
F	Merced	Norris, Lancaster	4	5½	16½	24
G	Mariposa	" "	4	5½	16½	24
H	Sonoma	" "	4	5½	16½	24
I	Industry	" "	4	5	16	24
J	Wm. Penn	" "	2	4½	10	18

Copy of a Printed Sheet Issued November 6, 1868, Listing the Locomotives Used in Building the Central Pacific Railroad

The Western Pacific Railroad, whose locomotives are also listed, was a line from Sacramento to Oakland which was absorbed by the Central Pacific about 1866



The *Governor Stanford*, the First Locomotive Used in Constructing the Transcontinental Railroad

steam locomotive for use in constructing the transcontinental railroad. It had been shipped around the Horn from New York. This engine was named the *Governor Stanford* and may be seen today in the museum at Stanford University, Palo Alto, California.

The locomotive and rails were transferred to the schooner *Anna R. Forbes* for shipment to Sacramento, where the engine was almost lost in the river during unloading. However, it was finally set up and its trial trip was held with ceremonies on November 10th, 1863.

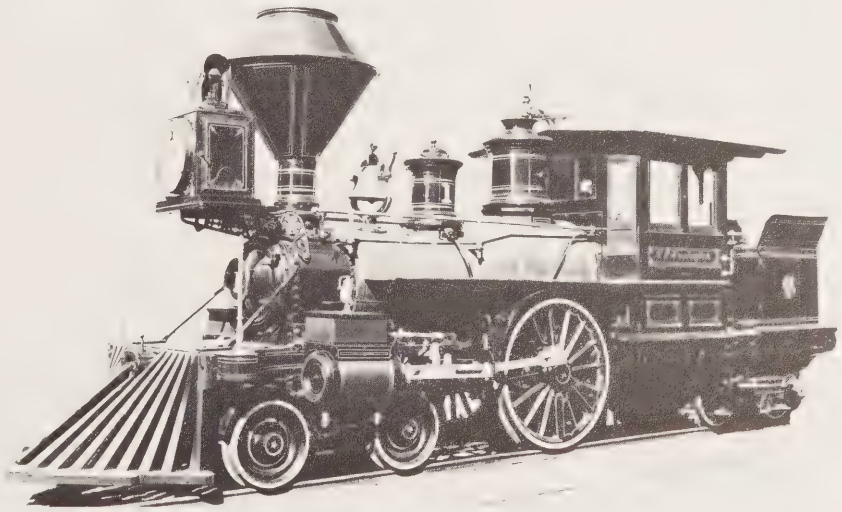
Due to the Civil War the price of all materials was astounding. The initial order for rails cost $115 a ton delivered in New York, but before the road was completed the price rose to over $250 a ton. Freight rates on material such as rails averaged $17.50 a ton around the Horn, and mounted to $50 across the Isthmus. Insurance climbed from 2½ to 17 per cent. Sailing vessels took six months, and often much longer, in making the 19,000-mile passage from New York to San Francisco, necessitating placing orders for such equipment as locomotives over a year in advance of the time they were required.

The accompanying list, dated November 6, 1868, gives an idea of the types of engines that were used in building the Central Pacific Railroad. All these early locomotives were picturesque in appearance. They had large diamond-shaped smokestacks, brass fittings, and their gay paint made them exceedingly ornate. While it was the fireman's job to keep the brass polished, it is said that some of the engineers were so proud of their locomotives that they worked on Sundays or days off to help keep them shined up.

Instead of merely having serial numbers as at present, these pioneers of the rails bore names, some of them of historical significance, while others indicated the emotions evoked in the minds of those who first beheld these novel steel monsters.

The *Governor Stanford* cost, delivered, $13,688, of which $2,282 represented freight by way of Cape Horn. Before the Civil War engines of this size could have been purchased for $7,000 to $7,500. At one time a scarcity of motive power necessitated dismantling two locomotives and transporting them across the Isthmus route, where the freight charges alone amounted to $8,100 for each engine.

The *C. P. Huntington* or Central Pacific No. 3—later renumbered S. P. No. 1—was placed in service early in 1864. It could haul



The *C. P. Huntington*, Placed in Service on the Central Pacific Railroad (Now Southern Pacific) Early in 1864

CENTRAL PACIFIC RAILROAD.

No. 1, TIME CARD No. 1.

To take effect Monday June 6th, 1864, at 5 A. M.

TRAINS EASTWARD.				TRAINS WESTWARD.		
Frt and Pass No 3	Frt and Pass No 2	Pass & Mail No 1.	STATIONS.	Frt and Pass No 1	Pass & Mail No 2.	Frt and Pass No 3.
5 P M leave	1 P M leave	6.15 A M, L	Sacramento	8.45 A M arr	12 M arr.	6.40 P M ar.
5.50 } mt frt 5.55 }	2.15	3.55	18 Junction	18 3	11.30	5.55 } mt. Ft 5.50 }
6.09	2.38	7.05	22 Rocklin	4 7.40	11.07	5.37
6.22	2.55	7.15 m et F.	25 Pino	3 7.15 mt pass	10.56	5.25
6.40	3.30 P M arr	7.30 A M arr	31 Newcastle	6 6.45 A M, L	10.30 A M, L	5 P M, L

Trains No. 2 and 3 east, and 1 and 3 west, daily, except Sunday.
Trains No. 1 east and 2 west, daily.

LELAND STANFORD, President.

First Official Timetable of the Central Pacific Railroad

four cars weighing 22 tons each at 35 miles per hour up a grade of 26 feet to the mile. It is still in serviceable condition but used only for exhibition purposes.

A short time later the first typical freight locomotive was received by the railroad. It was considered the wonder of the day because it could haul 18 light freight cars. It was named the *Conness* after one of California's United States Senators. An article in the *Sacramento Union* of March 17, 1865, telling of the trial trip of this engine, which had been held on the previous day, said—"The *Conness* is far the heaviest and most powerful locomotive on this coast, exceeding the *Atlantic* in propelling power by about 50 per cent. She is designed for drawing freight cars up the heaviest grade on the road, which is 105 feet to the mile."

By June, 1864, the rails had reached Newcastle, 31 miles east of Sacramento, where work temporarily stopped. Labor was scarce and independent. For over three long years the Civil War had drained the country of men, materials and money until finally gold—the only medium of exchange on the Pacific Coast—was quoted at $2.90 and currency at 35 cents. It was then that Charles Crocker literally stripped off his coat and took full command of all construction work. However, it was not until September, 1865, that the line reached Illinois Town—now Colfax.

The country ahead was changing from rolling foothills to the heavy grades of the forbidding Sierras. Again the labor problem became acute, but this time Crocker met a wage strike among the Irish laborers by bringing in a trainload of Chinamen. With wages of $26 a month, which later rose as high as $35, Chinamen began to flock in from San Francisco and Sacramento with their peculiar shaped basket hats, blue denim blouses and flapping pants. They proved to be industrious and efficient toilers, and President Stanford reported: "Without them it would be impossible to complete the western portion of this great national highway within the time required by the Acts of Congress." When Crocker was criticized for putting Chinamen on masonry work, he replied: "Why not? Didn't they build the Chinese Wall, the biggest piece of masonry in the world?"

With the coming of winter, storm succeeded storm until the snow lay 20 feet on the level and over 60 feet deep in the drifts. Half the men were busy keeping the right of way clean. The snows gained on the shovellers until the railroad cuts filled up, and often the tunnel men had to excavate

Locomotive *Bison*, Number 57 of the Central Pacific Railroad, Photographed at Rocklin, California, in 1872

Chinese Laborers Filling Dirt Around a Wooden Trestle in the Sierra Nevada Mountains, Using One-Horse Dump Carts and Wheelbarrows

through 20 to 100 feet of drift before they reached the face of the cliff.

The Summit tunnel, 1,650 feet long, took a year to complete. The price of powder, which had to be ordered nine months to a year in advance of delivery, rose from $2.50 to $5 a keg. The demands of the armies of the North and South had practically cleaned out the market and prices skyrocketed still higher until the railroad was paying $15 a keg. Some of the granite encountered was so hard that shots spurted from the holes as if from a cannon.

During the winter, men and materials and even locomotives were hauled on sleds over the summit to carry on work in the Truckee River Canyon where the snow was light enough to shovel aside. Slowly and regardless of expense, the summit of the Sierra was finally conquered, thence down the eastern slope to meet the crews that were laboring upward from the foot of the range at Donner Lake.

By this time the Union Pacific was racing westward across the Laramie plains in strides of over a mile of rail a day. By the Act of 1866, Congress had amended the Act of 1862 and now authorized the Central Pacific "to locate, construct and continue their road eastward in a continuous complete line, until they shall meet and connect with the Union Pacific." Rapidly the two railroads forged ahead. No such road building had ever been dreamed of. While the Central Pacific swept across the arid Nevada Desert, the Union Pacific crossed the Rockies and entered Ogden.

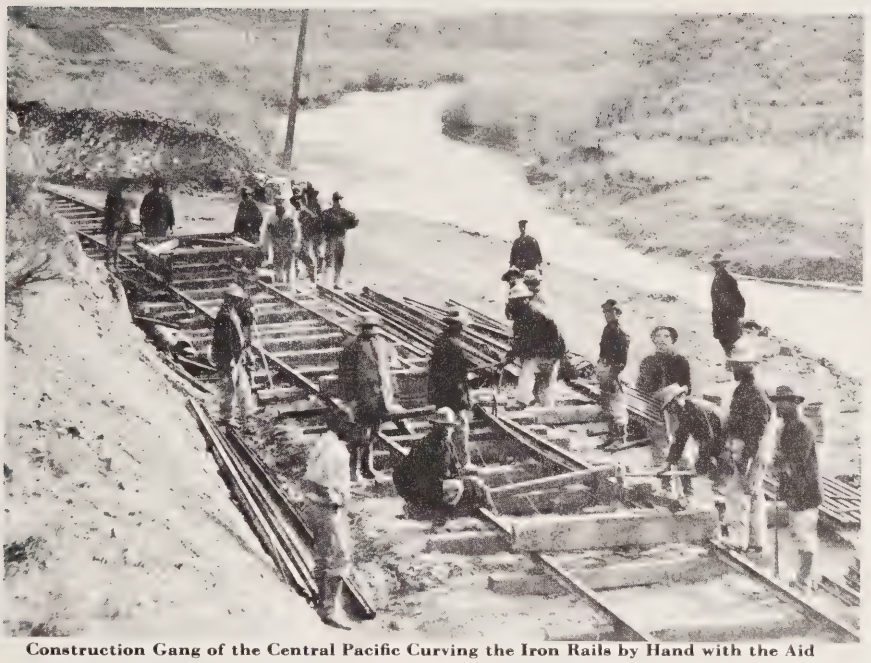
As the gap closed between the two roads, intense rivalry developed. The Union Pacific laid six miles of track in one day between sunup and sundown. Crocker's "Chinese pets" of the Central came back and laid seven miles. Then Jack Casement of the Union Pacific swore that "No damned Chinaman can beat me laying rails" and, working from three in the morning until midnight, he put down 7½ miles of track. Crocker replied, "The Central promises to lay 10 miles in one day." Vice President Durant of the Union Pacific promptly wired—"Ten thousand dollars you can't do it." "We'll notify you," answered Crocker.

Crocker carefully laid his plans and marshalled his forces. Ties were laid ahead on the graded roadbed and when everything

Government Commissioners Inspecting a Newly-Laid Portion of the Transcontinental Railroad, February, 1869

Courtesy Southern Pacific

Central Pacific Work Train in the Sierra Mountains During 1865 When the Railroad Grade was Being Cut Above Auburn. Chinese Working with Picks and Shovels, One-Horse Dump Carts and Black Powder Carved a Right-of-Way Through Solid Granite.



Construction Gang of the Central Pacific Curving the Iron Rails by Hand with the Aid of Heavy Hammers

was in readiness rails and track material were moved up from the rear. At 7 o'clock on the morning of April 28, 1869, the great task began. A train of 16 cars loaded with iron rails and material for two miles of track was pushed up to the front. Men climbed on top and threw off the fishplates and kegs of bolts and spikes, while others rolled off the rails. In six minutes all the cars were cleared with a noise that sounded like an artillery bombardment.

As soon as the material train was pulled back, light hand cars were placed on the tracks and loaded with 16 rails together with kegs of bolts and spikes and bundles of fishplates. Two horses with riders were hitched to the cars in tandem by a long rope. As quickly as the car was loaded a crew of Chinamen jumped on top and the horses dashed off on the gallop. The first car out from the material dump had to go only a short distance, while the last cars had to travel about two miles. At the same time empty cars were returning on the single track. As an outbound car approached, the crew of the empty car jumped off and lifted their car from the rails while the loaded car sped past without slackening speed.

The track went forward at the rate of almost a mile an hour. At one time 240 feet were laid in one minute and 15 seconds. This is about as fast as a leisurely walk and just as fast as the early ox teams plodded across the plains.

When the forward march was finally halted, 10 miles and 200 feet of new track had been added to the Central Pacific and a locomotive was run over the line at a clip of 40 miles an hour just to show how well the job had been done. Ten miles of track laid between 7 o'clock in the morning and 7 o'clock in the evening, with an hour out for the midday meal, is a record that probably will never be challenged. As a comparison, it may be noted that the American army engineers in France, in 1918, achieved the mark of 130 miles of track in 100 days or about 1⅓ miles per day.

Camp of the Central Pacific at Victory, Utah, a Few Miles from the Spot Where the Last Spike Was Driven

The Completion of the First Transcontinental Railroad with the Driving of the Last Spike at Promontory, Utah, May 10, 1869

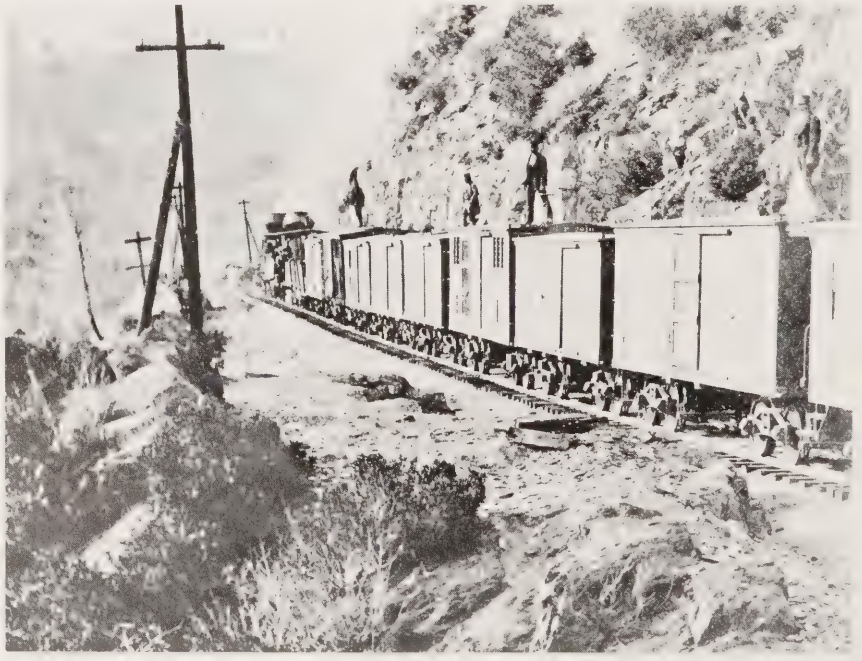
The men on the ground shaking hands are the chief engineers of the railroads whose lines were joined; S. S. Montague of the Central Pacific on the left, and Major G. M. Dodge of the Union Pacific on the right

The obligatory speeches having been delivered the Golden Spike was driven into a highly polished tie of California laurel. The two locomotives *Jupiter* and number 119 steamed slowly forward and a bottle of champagne was broken over their pilots as they met. In six years these two companies had built by hand almost 1,800 miles of track of which 1,100 miles were laid during the final 13 months of construction.

With the driving of the Golden Spike and cessation of railroad construction activities, the Central Pacific's General Shops at Sacramento turned their attention to the building of locomotives. In 1872 they turned out C. P. 173, a 4-4-0 type engine having 17″ x 24″ cylinders, 57″ drivers and capable of developing 14,480 pounds of tractive force. The steam chest was equipped with automatic self-feed oilers, although these evidently were not entirely relied upon, as tallow oilers were also applied. The engine fairly glistened with brass trimmings and brass bands holding the jacket in place, and

On May 10, 1869, final arrangements were completed for joining the tracks of the Central Pacific and Union Pacific at Promontory Point with appropriate ceremonies. President Stanford and other officials of the Central arrived from the west on a train decorated with red, white and blue bunting and drawn by the *Jupiter*, Number 60. The train bearing the official party from the east was hauled by engine number 119. These two locomotives were quite different in appearance, the *Jupiter* having a flaring funnel stack common to the Central Pacific, while number 119 presented the straight type of stack. Both engines were ornate with bright paint and brass filigree.

The Central Pacific's connecting rail was carried forward by a squad of Crocker's Chinamen, while the Union Pacific's last rail was brought into place by a picked Irish crew. Meanwhile the whistles on both locomotives shrieked and according to a story told by one of those present—"We all yelled fit to bust."



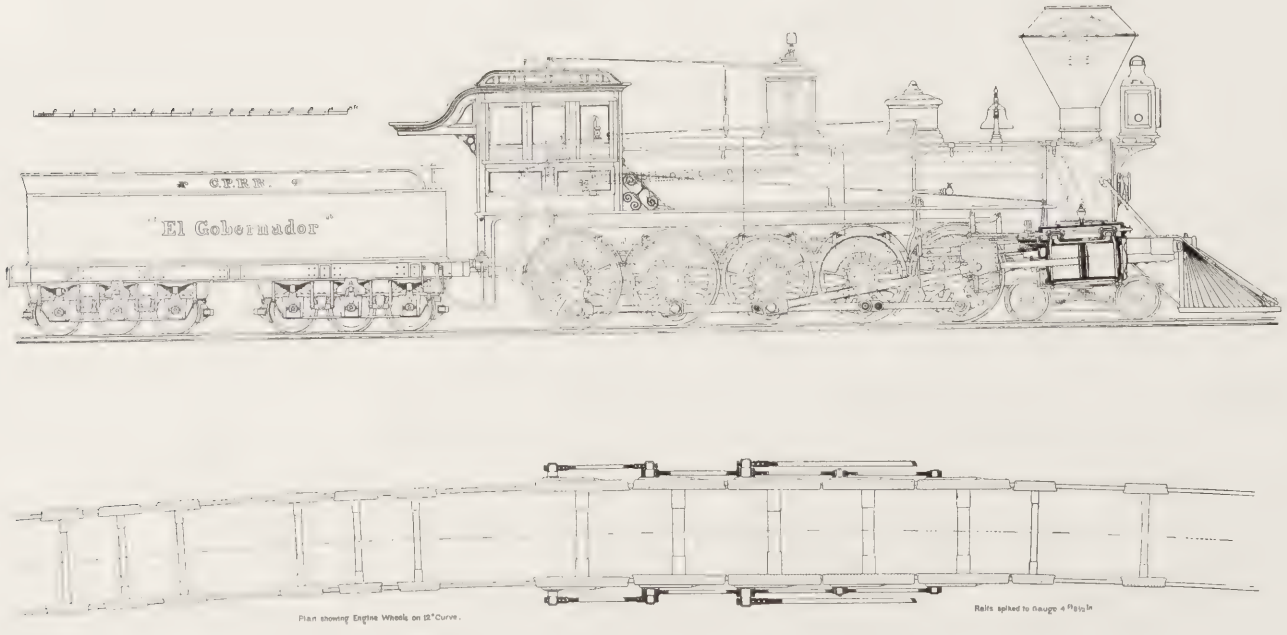
A Central Pacific Freight Train of the Year 1870 in the Sierra Nevada Mountains in California

A Brace of 4-8-0's Tackles the Steep Tehachapi Grade near Mojave in 1897. Leading Engine No. 1986, a Schenectady Cross Compound Later Became No. 2932. (BELOW) The Tehachapi Loop was a Master Stroke of Railroad Engineering. A Pair of Woodburners on the Loop in 1876 When Trains First Operated over the New Line that Linked Los Angeles with San Francisco.

Courtesy Southern Pacific

Courtesy H. H. Arey

Baldwin 2-6-0 of 1883 Vintage Pauses on the Oregon Main Line for an Early Day Photograph. Note the Interesting Wooden Boxcar Lettered Oregon & California and the Oregon Railway & Navigation Car to the Right of the Locomotive.



"EL GOBERNADOR," FOURTEEN-WHEEL LOCOMOTIVE FOR THE CENTRAL PACIFIC RAILROAD

Built at the Company's Shops in Sacramento, Mr. A. J. Stevens, General Master Mechanic

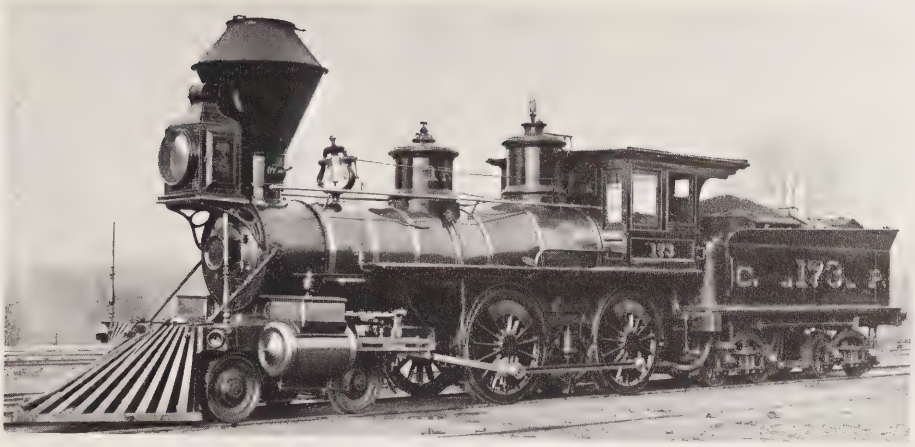


Photo by D. L. Joslyn

Central Pacific Locomotive, Number 173, Built at the Sacramento Shops in 1872

an elaborate brass builder's plate was placed between the mud guards. Numbers and lettering were painted in red shaded with green and gold. Two great broad stripes of gold edged with green and red encircled the tender. The cab was finished in highly polished wood and the outstanding feature was a beautiful painting of the Yosemite Valley on each side panel of the large headlight. The accompanying picture of engine Number 173 was taken after these decorations had been removed, but their general style was the same as shown on engine number 55.

Due to the heavy Sierra grades, the Central Pacific and later the Southern Pacific have always been pioneers in the development of large and powerful locomotives. In 1882 the railroad placed in service engine number 229, a 12-wheeled 4-8-0 type freight locomotive which was called the *Mastodon*. This engine had 19″ x 30″ cylinders, 54″ drivers and with 135 pounds boiler pressure developed 23,200 pounds of tractive force. On account of the construction of the valves, which were quite heavy and worked one on top of the other, it was necessary to apply a steam reversing gear. This experimental engine proved so satisfactory that later an order for twenty more, including double valves, steam brakes and steam reversing gear, was placed with Danforth, Cooke & Company.

The success of the *Mastodon* tempted Master Mechanic A. J. Stevens to design a still larger engine and in 1883 he built the famous *El Gobernador*, which had a 4-10-0 wheel arrangement. This so-called "iron monster" was at that time the largest locomotive in the world, weighing 146,000 pounds in working order, in comparison to which their latest single expansion articulated engines, built by The Baldwin Locomotive Works, each weigh 639,500 pounds exclusive of the 296,000 pound tender.

The boiler of the *El Gobernador* had a copper firebox which was standard at that time. The steam valves were of the rotary balanced type with double admission, driven by Stevens valve gear employing one eccentric on each side, and reversing from the rocker which was connected to the crosshead with a union arm. Wide interest was created in the new valve gear and this, coupled with the fact that it was such a large engine, caused it to be spoken of and its pictures to be published all over the world.

The *El Gobernador* was kept at the Sacramento Shops for almost a year after it was built, while trestles along the line were strengthened. During this period the big engine was often on exhibition and when a large tourist train passed through Sacra-

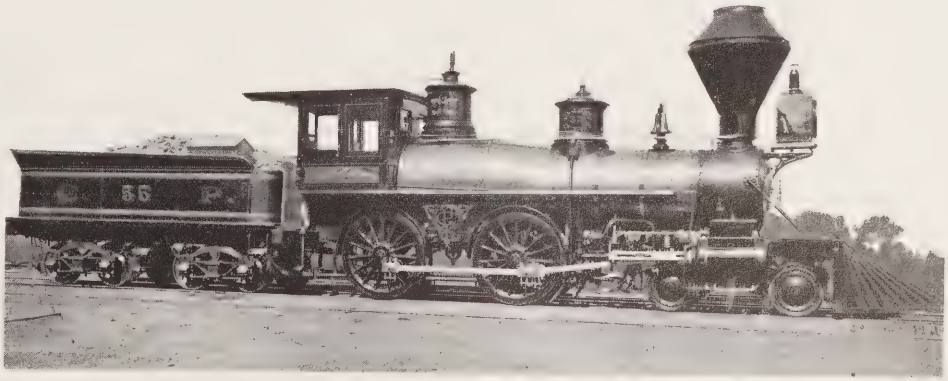


Photo by D. L. Joslyn

Central Pacific Number 55, Built at Sacramento About 1873

On August 19, 1887, Santa Barbara's First Train Rolled in Past Excited Crowds. The Next Day a Special Excursion Train with Distinguished Visitors from All Over California Joined in the Celebration. (CENTER) Central Pacific Coach Stands Alongside Los Angeles Harbor circa 1873. Today the Mud Flat Land in the Background has Been Filled to Form Terminal Island. (BELOW) Old Los Angeles Arcade Station Forms a Scene for this Portrait of No. 1364 and Her Proud Crew.

All Pacific Railway Journal Collection

***El Gobernador*, Built at Sacramento Shops in 1883 and at that Time the Largest Locomotive in the World**

Cylinders	21″ x 36″	Weight on Drivers	128,000 lb.
Drivers, diam.	57″	Weight, total engine	146,000 lb.

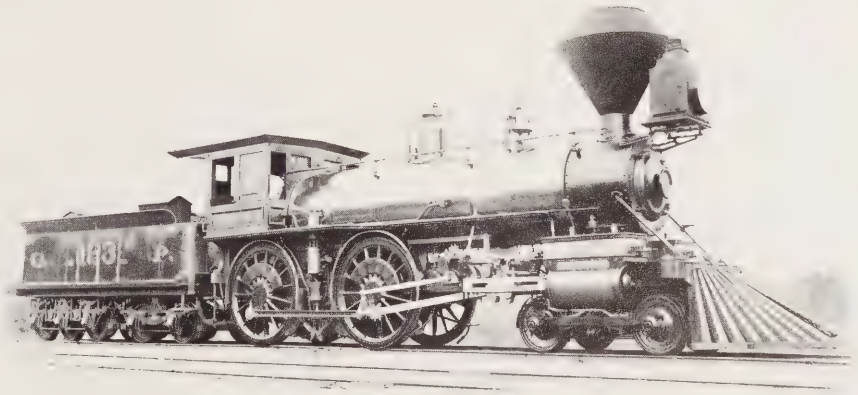
mento, it would be steamed up and would pull a long string of cars past the depot much to the wonder and amazement of the people. The locomotive, however, was not a complete success and after 10 years of service it was returned to Sacramento and broken up.

In 1885 the Central Pacific properties were taken over by the Southern Pacific and during the next few years a number of locomotives were built at the Sacramento shops. The ten-wheeler number 177, illustrated, was typical of their design. These engines had the sand boxes mounted under the belly of the boiler. They were originally equipped with steam brakes between the second and third pair of drivers, the brakes being set by the aid of cams. These were later changed to air operation but were left in the same position.

About this same period a number of 4-4-0 type locomotives, as illustrated by engine number 123, were placed in service. These were passenger engines designed for speed, having cylinders 17″ x 26″, drivers 68″ in diameter and a weight of 88,500 pounds in working order. They were found to be too heavy on the front truck, causing overheating of the brasses and journals. To eliminate this trouble, a pair of equalizers were placed outside of the truck wheels and the axles lengthened so that they had four bearings. Counter weights on the drivers, instead of being placed next to the rim of the wheel, were placed in the wheel center at the same distance from the axle as the main pin.

A number of Consolidation type freight locomotives built at this time were familiarly known by the enginemen as "Monkey-hogs." They were equipped with Stevens valve gear, frequently called Stevens "Monkey Motion" because of the peculiar motion of the eccentric rod which had the appearance of a monkey hopping along. Like all other Southern Pacific engines of that date, they had sand boxes under the boiler. They had 19″ x 30″ cylinders set at an angle, 51″ diameter drivers and weighed 114,850 pounds in working order.

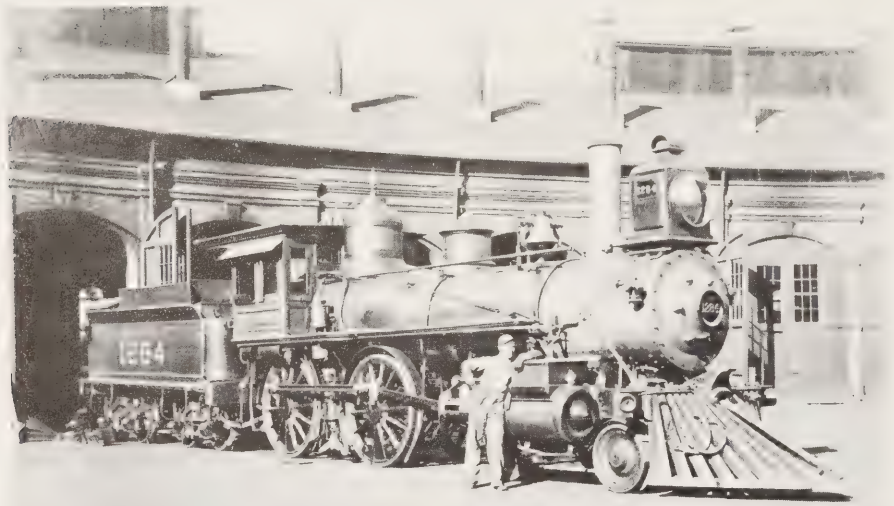
Thirty years after the *Governor Stanford* had made its initial run out of Sacramento on November 11, 1863, much progress had been made in the design and size of locomotives on the Southern Pacific. The latest 4-6-0 type passenger locomotives then in service were capable of hauling six coaches weighing 30 tons each at a speed of 50 miles per hour up a grade of 26 feet per mile. Freight locomotives of the 4-8-0 type could handle 65 cars weighing 30 tons each at a



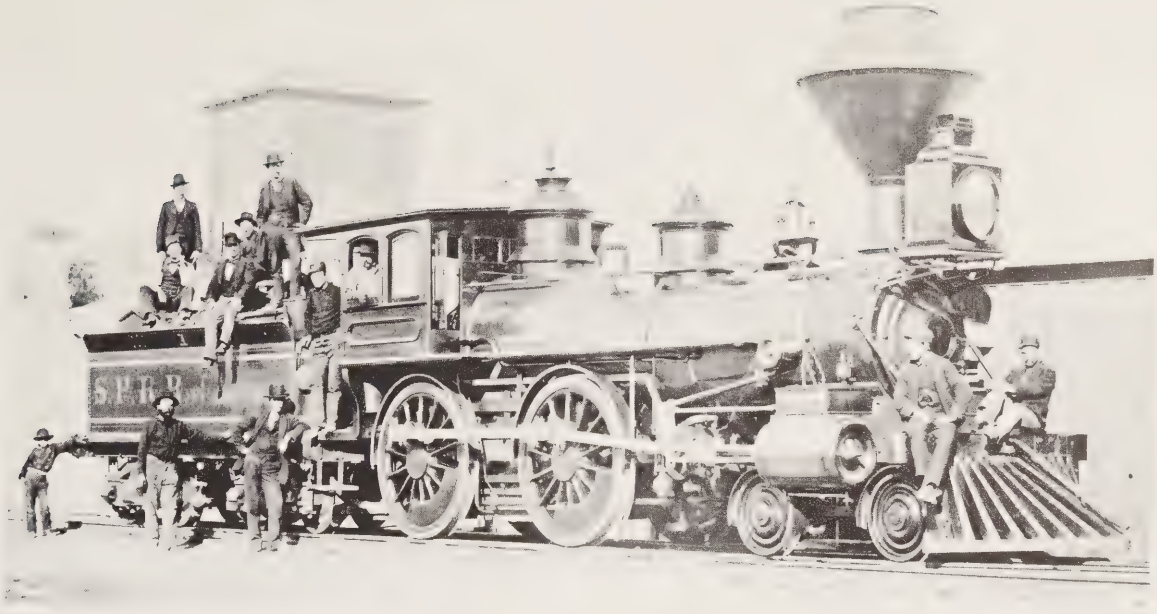
American (4-4-0) Type, Built at Sacramento in 1886, Showing Outside Truck Bearings Added to Relieve Excessive Pressure on Original Axle Bearings

Cylinders	17″ x 26″	Steam pressure	150 lb.	Heating surface	1,269 sq. ft.
Drivers, diam.	69″	Grate area	20 sq. ft.	Tractive force	13,900 lb.
	Weight on drivers	52,800 lb.		Weight, total engine	88,500 lb.

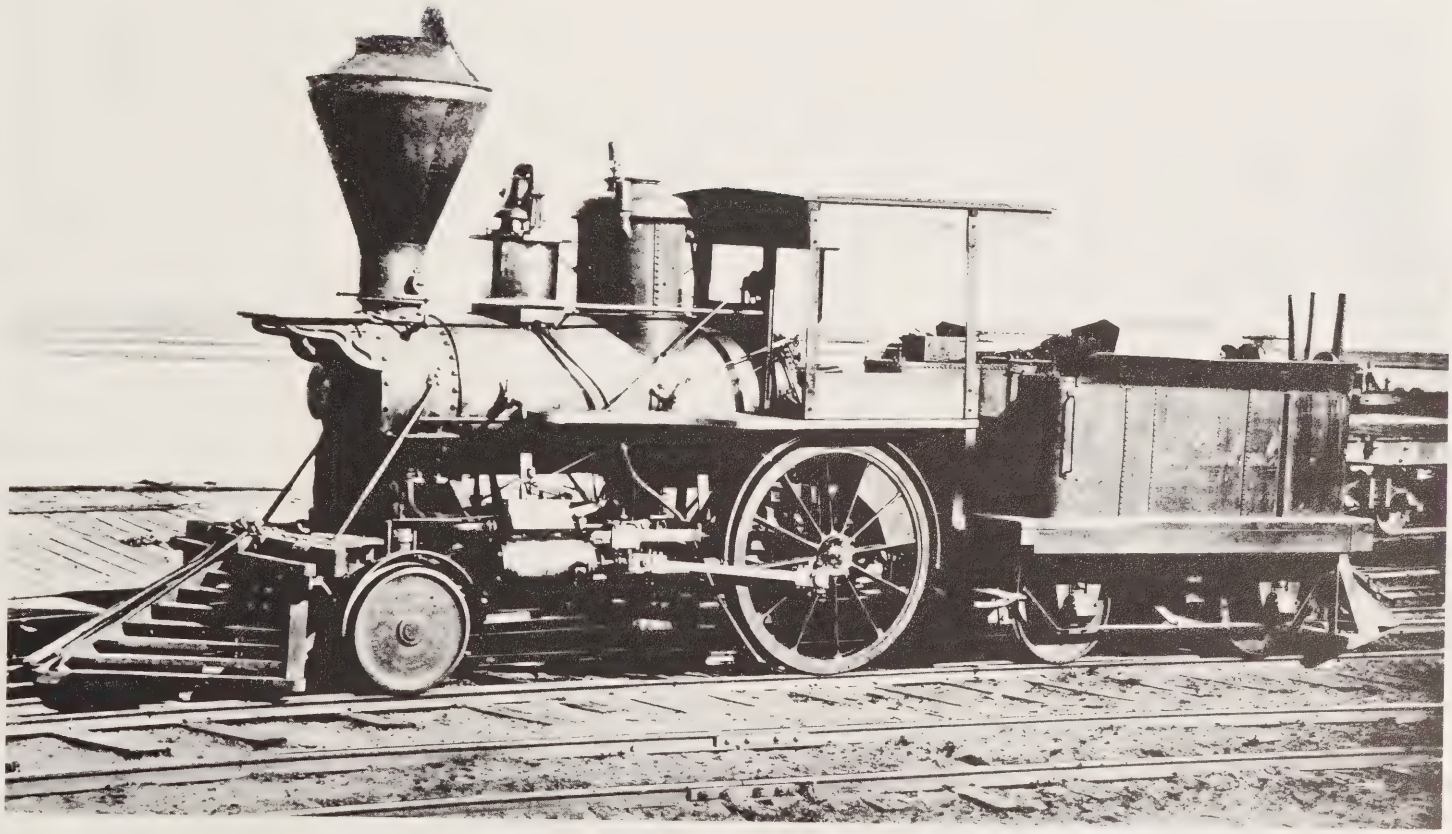
All Pacific Railway Journal Collection



Rogers Built 4-6-0 Rests Beside the Stall for Iron Horses in This Early Day Scene. Central Pacific No. 86 Reflects the Early Development of Railroading. Note the Name "Rogers" on the Cylinder. This Locomotive was Complete with Back-up Light and Running Boards on the Tender. (CENTER) Almost Every Locomotive Design has Been Reported on Southern Pacific Iron Including this Norris Built 4-4-0 Constructed in 1884. (BELOW) Back in the 1880's This was a High Standard Coach Train on the San Joaquin Valley Line.



This Beautiful 4-4-0 was No. 1 on the Southern Pacific of Arizona as Shown at Yuma during 1881. Built by Schenectady in 1879, She Later Became Southern Pacific No. 81 and Eventually No. 1312.



Locomotive "San Gabriel" was the First Engine to Turn a Wheel in Southern California. It was Placed in Service January 4, 1869, by the Los Angeles & San Pedro Railroad Company. The 22 Mile Line Which Ran from Wilmington to Los Angeles Later Became Part of Southern Pacific.

Courtesy H. H. Arey

Virgin Forests Tower Above the Track of this Western Timberland Scene as No. 2929 Nears the Summit of the Oregon Coast Range. (BELOW) Extra No. 2138 with No. 2940 Picks Up Speed with a Train of Oregon Logs for the Awaiting Saw Mill.

Courtesy H. H. Arey

Ten-wheeled (4-6-0) Type, with Stevens Valve Gear, Built at Sacramento in 1887

Cylinders	18″ x 30″	Steam pressure	145 lb.	Heating surface	1,453 sq. ft.
Drivers, diam.	57″	Grate area	24.5 sq. ft.	Tractive force	21,020 lb.
Weight on drivers	78,700 lb.		Weight, total engine		105,100 lb.

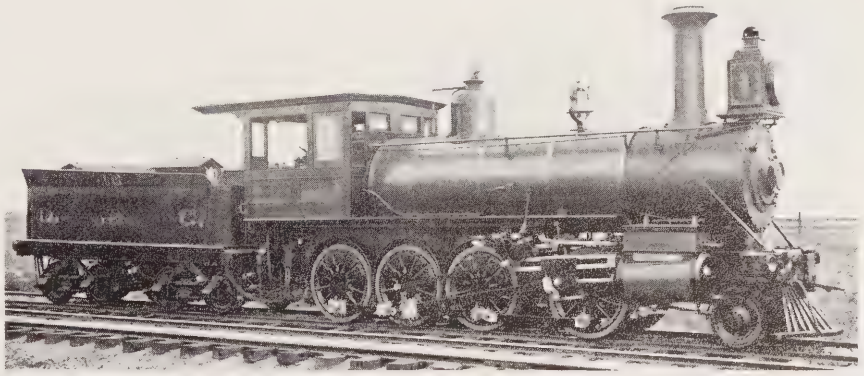
speed of 10 miles per hour up the same grade.

During those 30 years the railroad had purchased locomotives from such well known builders as Richard Norris & Sons, Mason Manufacturing Company, Danforth, Cooke & Company, McKay & Aldus, New Jersey Locomotive Company, Schenectady Locomotive Works, Baldwins, Rogers, Rhode Island and several others, all of which with the exception of The Baldwin Locomotive Works have long since gone out of business or lost their name and identity through consolidations.

The Southern Pacific was one of the first railroads to use oil as a fuel for locomotives. The first engines converted in 1900 had the burner placed in the rear end of the firebox and burned the oil under a brick arch which extended back about 30 inches from the front water leg. However, this arrangement was not satisfactory when the engine was being heavily worked as the draft frequently lifted the flame over the arch where it impinged directly on the crown sheet and back tube sheet, causing leaky staybolts and tubes. Moreover, it was extremely difficult to prevent the arch from falling down. The first improvement was to replace the arch with a double flash wall, consisting of a wall with "pigeon hole" openings which in turn was backed by a solid brick wall with an intervening space of about 6 inches. The face of the double wall was located about 48 inches in front of the burner. At the same time the original burner which had an inside feed was replaced with an outside feed type designed by George Von Boden, Fuel Supervisor. This Von Boden-Ingles burner had two separate parts or chambers running its entire length and a corrugated lip in front of the steam outlet at the nose of the burner, which greatly assisted in atomizing the oil.

After experimenting first with the arch and then with the double flash wall, it was found that placing the burner at the front end of the firebox gave a more complete and uniform distribution of the heat due to the longer path travelled by the flame before entering the tubes. At the same time that the burner was moved to the front of the firebox, the vertical draft was changed to a horizontal method of drafting through the firebox door and around the burner. This method of burning oil has, with a few minor modifications, become the standard practice on the Southern Pacific.

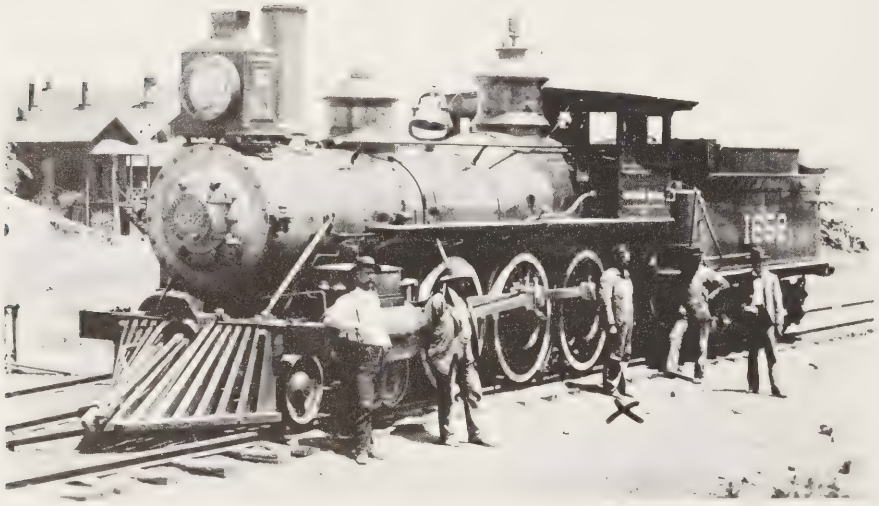
Between 1902 and 1907 Baldwin built upward of 270 Consolidation type freight locomotives for the Southern Pacific. While the larger portion of these engines had 22″ x



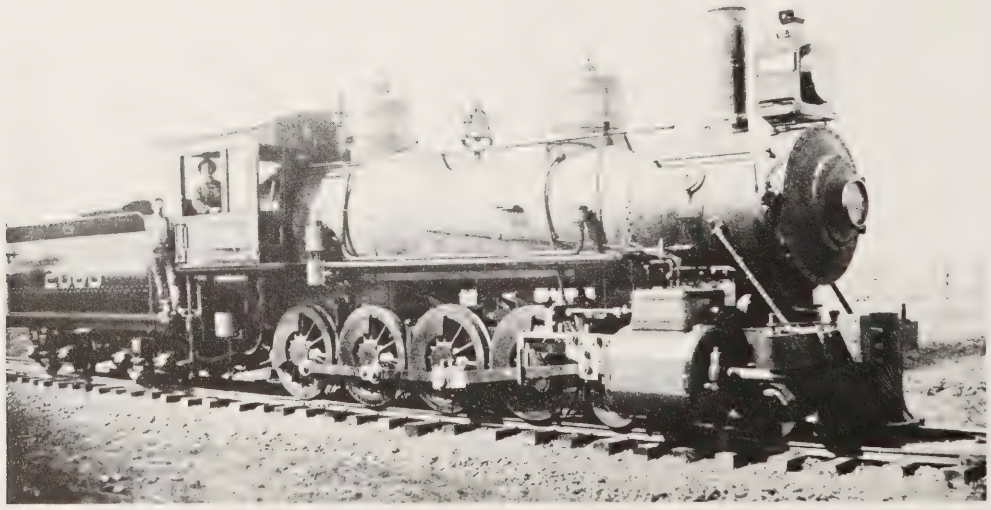
Consolidation (2-8-0) Type, Built at the Sacramento Shops in 1887

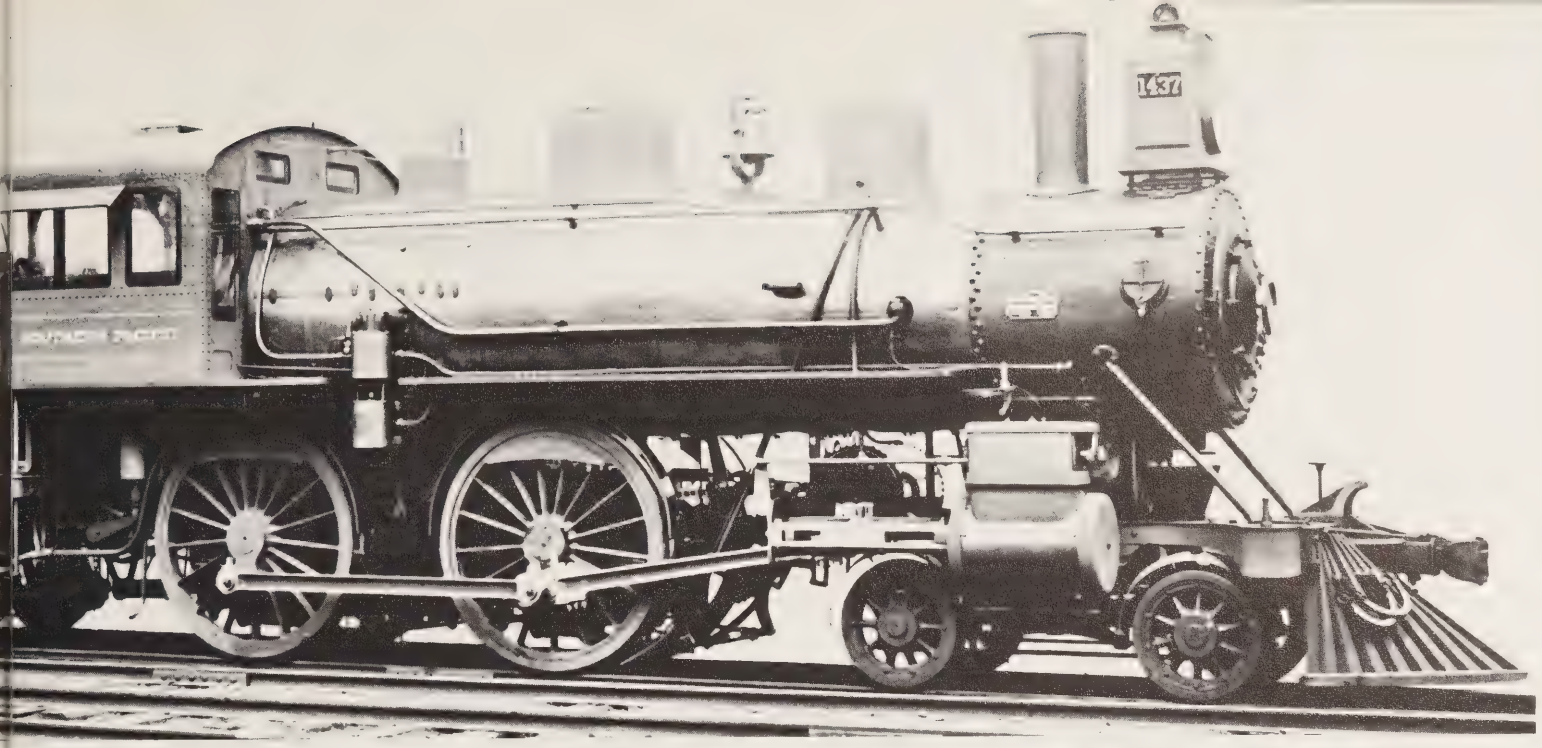
Cylinders	19″ x 30″	Steam pressure	150 lb.	Heating surface	1,600 sq. ft.
Drivers, diam.	51″	Grate area	28 sq. ft.	Tractive force	27,080 lb.
Weight on drivers	96,500 lb.		Weight, total engine		111,350 lb.

All Pacific Railway Journal Collection



Switcher No. 1025 Built in 1888 Provided 40 Years of Service. (CENTER) Crew Photograph Beside a 4-6-0 Built by Cooke During 1899. (BELOW) No. 2000 was Built in 1892 by Schenectady and Later Became 2nd No. 2847 — Lastly No. 2947.





Schenectady Built this 4-4-0 in 1899 for the Southern Pacific of California as Their No. 1437 and Later Became Texas & New Orleans No. 271.

President McKinley Special Complete with Bunting Arrives on Alameda Street in Downtown Los Angeles During 1901 with Locomotives No. 2279 and No. 2281.

30″ single expansion cylinders, a number were equipped with Vauclain compound cylinders 17″ and 28″ in diameter and demonstrated their ability to handle heavy trains with a material reduction in fuel consumption.

Upon the introduction of the Mallet Locomotive in the United States, the Southern Pacific quickly saw the advantages to be gained from the adoption of this articulated type of compound engine on the heavy grades and sharp curves encountered in crossing the Sierras. After making a thorough study of the conditions on the mountain grades, Baldwin designed and built two Mallets, having a 2-8-8-2 wheel arrangement, which were guaranteed to handle two times the tonnage hauled by the Consolidation engines. When the Mallets went into service it was gratifying to learn that they were capable of fulfilling this guarantee.

The experience gained in operating these first two Mallets through the tunnels and snow sheds, indicated the desirability of placing the engine crew where a better view of the track could be obtained. Accordingly the Baldwin engineers suggested a modified design whereby the cab was placed in front. As oil fuel was used, no difficulty was experienced in conveying it from the tender to the firebox. This arrangement proved so successful that additional orders were placed with Baldwin until the railroad had 49 of these engines in freight service.

The Southern Pacific Mallets were the first built by Baldwin with a 2-8-8-2 wheel arrangement. The boiler was what was known as the separable type, with a feed water heater and smoke box reheater in the front section. The injector piping was so arranged that the feed entered the heater at the bottom and left at the top, thus giving circulation to the entire depth of water. The tender tanks were semi-cylindrical in shape.

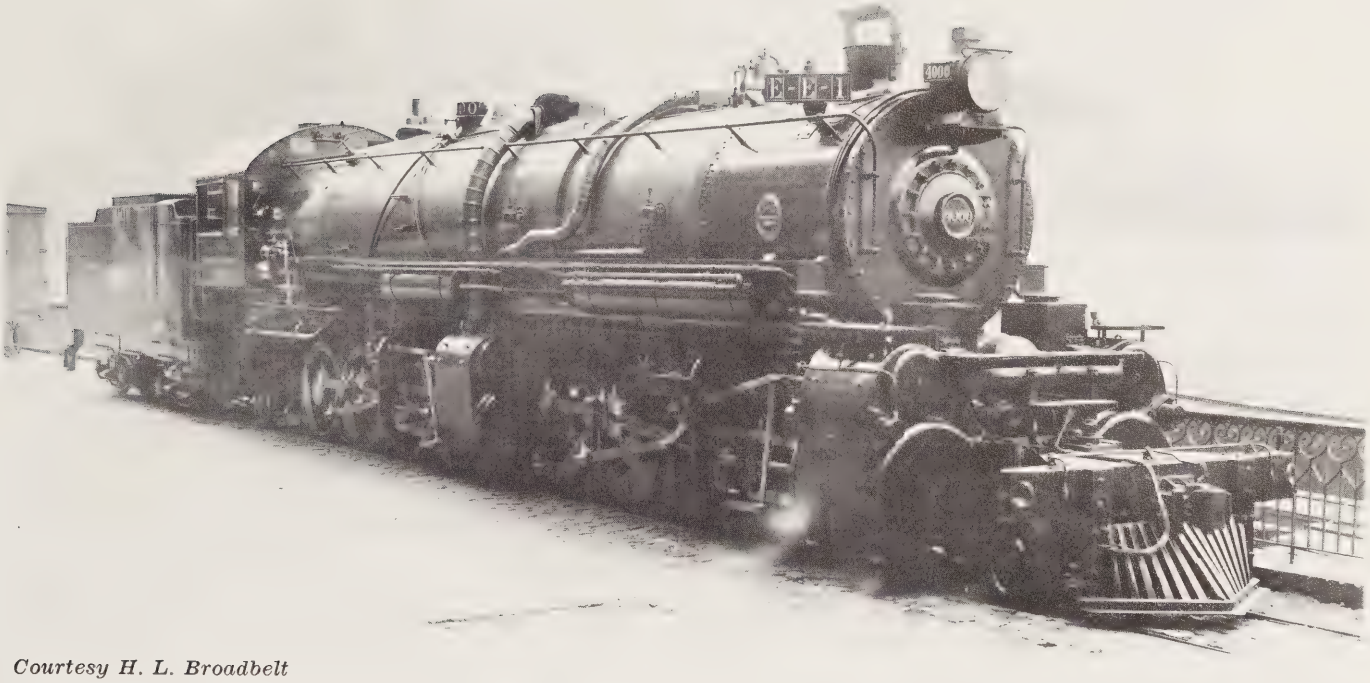
On a "drag haul" at 6 to 8 miles an hour these freight Mallets were exceptionally powerful and at the same time very light in fuel consumption for the tonnage handled. They could be aptly compared to the pioneer farmer's ox team—unsurpassed for heavy slow hauling but not so good for a fast rig with which to go to town.

To avoid double heading passenger trains over the mountain, Baldwin in 1911 built 12 2-6-6-2 Mallets especially designed with 63″ drivers for passenger service. These engines like the freight Mallets had the cab placed at the front end. The boiler was of the separable type with feed water heater but the re-heater as used on the freight locomotives was omitted. The receiver pipe connecting the high and low pressure cylinders passed through a flue which traversed the feed water heater so that it would be exposed as little as possible to the cooling effect of the atmosphere. While these passenger Mallets were originally built with a two-wheeled leading truck it was later found necessary to replace this with a four-wheeled truck in order to obtain better tracking qualities in traversing the sharp curvature on the mountain grade.

With the entrance of this country into the World War, the sudden increase in tonnage to be moved with the then existing track facilities necessitated a freight locomotive capable of handling heavy loads at higher speeds. To meet this demand the Southern Pacific purchased in 1917, from

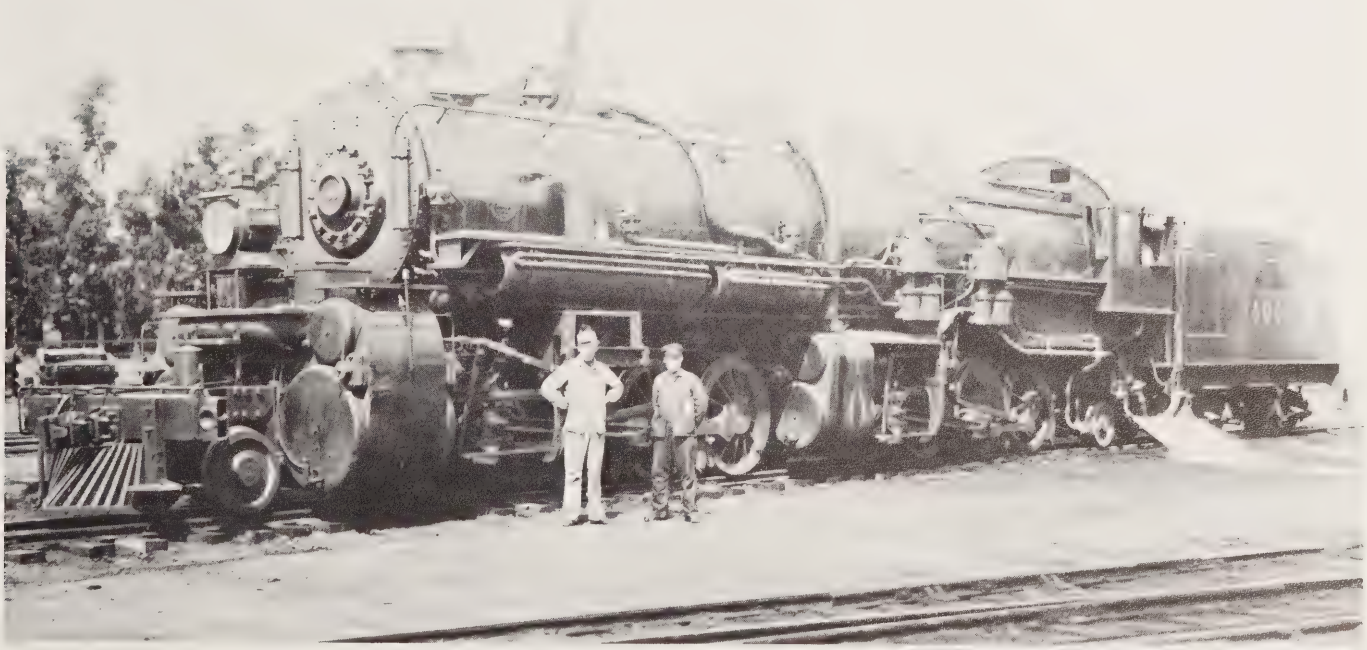
One of a Large Number of Consolidation (2-8-0) Type Locomotives, Built for the Southern Pacific by Baldwin Between 1902 and 1907

Cylinders	22″ x 30″
Steam pressure	200 lb.
Drivers, diam.	57″
Grate area	54.5 sq. ft.
Heating surface	3,573 sq. ft.
Weight on drivers	177,000 lb.
Weight, total engine	201,000 lb.
Tractive force	43,300 lb.



Courtesy H. L. Broadbelt

Baldwin Works Built Two 2-8-8-2 Mallets for the Sierra Grade as Southern Pacific No. 4000 and No. 4001. Both Locomotives Performed on the Big Hill as no Locomotive had Ever Done. Only Catch was Crews Became Asphyxiated When These Giants Passed Under the Snowsheds or Through the Many Tunnels. (ABOVE) No. 4000 as She Leaves the Baldwin Locomotive Works. (BELOW) Test Day for No. 4001 as Crew Pose for a Record Shot Before Ascending the Sierra Grade.

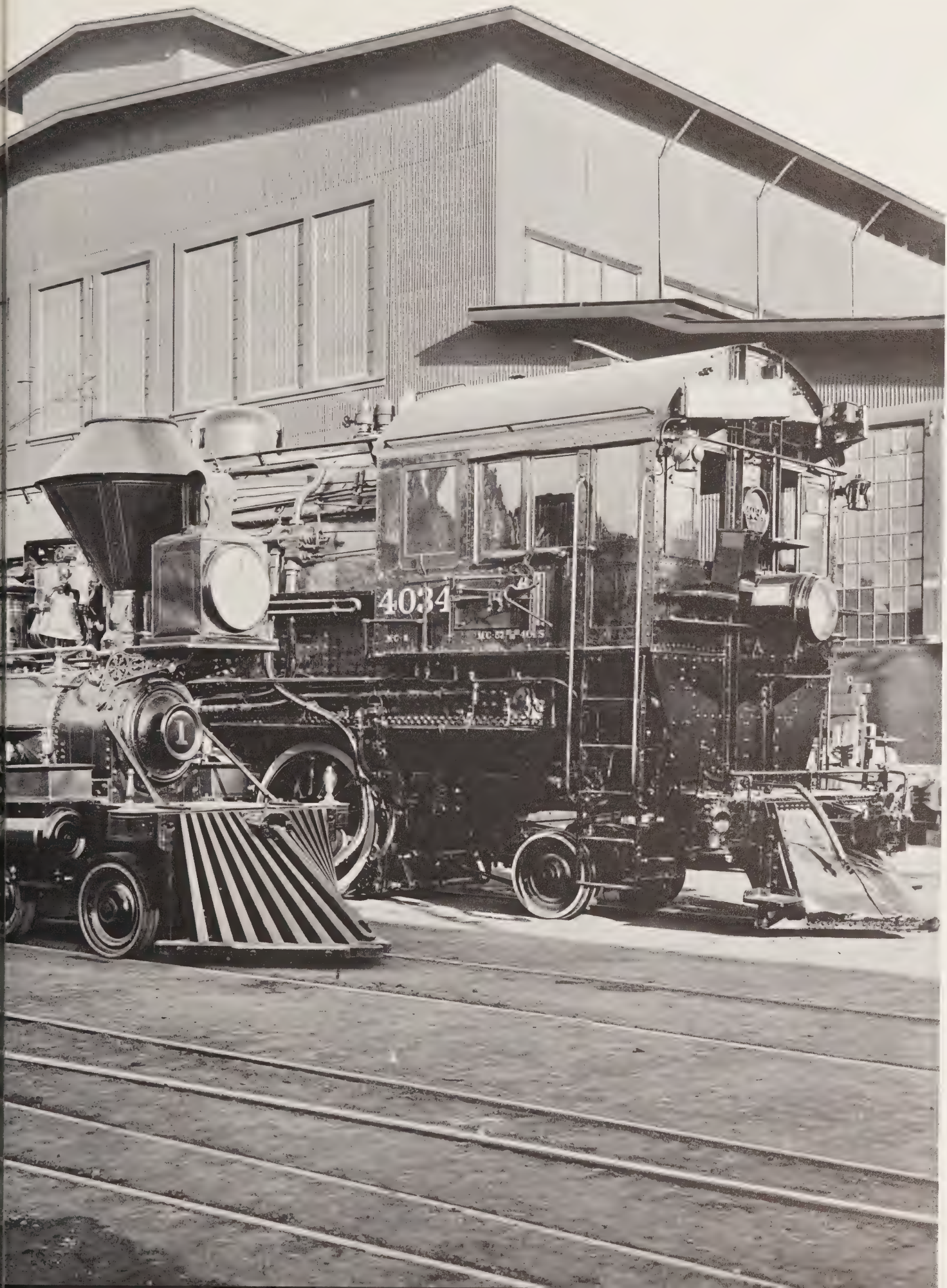


Pacific Railway Journal Collection

Giant and Dwarf

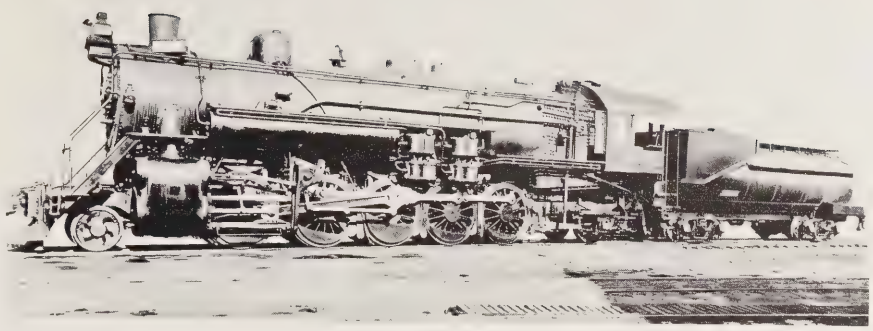
The Little Wood-Burning "C. P. Huntington" Built in 1864 is Dwarfed by Mallet No. 4034 at Sacramento Shops. Illustrated is 46 Years of Locomotive Development on the Southern Pacific.

Courtesy Southern Pacific


4034

Pacific Railway Journal

Mallet Locomotive of the 2-8-8-2 Type Moves Beyond Antelope Valley With a Los Angeles Bound Manifest.



Ten of These 2-10-2 Type Locomotives Were Delivered to Southern Pacific by American Locomotive in 1917 While Baldwin Built 150 Additional Between 1919-1923.

the American Locomotive Company, ten locomotives with a 2-10-2 wheel arrangement. Further orders for this type of engine were placed with Baldwin who furnished in the neighborhood of 150 during the next few years. These powerful freight locomotives weighed 397,900 pounds and developed a tractive force of 75,150 pounds. At the time they were built they were considered to be the most completely equipped self-propelled power plants yet produced for fast freight service. The first Baldwin type locomotives with this wheel arrangement used by the Southern Pacific were built in 1917 and were designated as Class F-1. These locomotives weigh 348,000 pounds and develop a tractive force of 65,300 pounds, and have been successfully employed, not only in freight service, but also in passenger service in the mountain districts. On the line between Los Angeles and Bakersfield, California, for example, where there are long grades of 2.37 and 2.54 per cent, passenger traffic is handled with this class of power.

In 1921, the Southern Pacific received from The Baldwin Locomotive Works, a group of heavier locomotives of the 2-10-2 type, known as Class F-3. These locomotives weigh, without tender, 385,900 pounds and develop a tractive force of 75,150 pounds. They have recently been followed by a group of 50 locomotives designated as Class F-4, which develop the same tractive force from the main cylinders as Class F-3, but present a number of differences in design and equipment. The Class F-4 locomotives are, in fact, among the most completely equipped "self-propelled power-plants" yet produced for heavy freight service; and they represent close to the maximum capacity that can be developed in a non-articulated locomotive, carrying the heaviest wheel-loads permitted.

These locomotives, although designed to traverse curves as sharp as 20 degrees, have flanged tires on all the wheels. The lateral play between rails and flanges on the

A Mallet Locomotive of the 2-8-8-2 Type, Built by The Baldwin Locomotive Works in 1912

Cylinders, H.P.	26″ x 30″	Steam pressure	200 lb.	Heating surface	5,626 sq. ft.	Weight on drivers	400,900 lb.
Cylinders, L.P.	40″ x 30″	Drivers, diam.	57″	Grate area	68.4 sq. ft.	Weight, total engine	436,200 lb.

Right-hand Side

first, third and fifth pairs of drivers is 7/8 in., and on the second and fourth pairs, and the truck wheels, 5/8 in. There is, in addition, a lateral play between wheel hubs and boxes (including shoe and wedge play) of $1\frac{13}{16}$ ins. on the front drivers, and $\frac{5}{16}$ in. on the remaining pairs. This provides the necessary flexibility for work on sharp curves, in spite of the fact that the driving wheel base is no less than 22 ft. 10 ins.

The cylinders are fitted with hard cast iron bushings, and the pistons have cast steel heads and cast iron bull-rings. The steam distribution is controlled by piston valves 15 ins. in diameter, which are set with a maximum travel of 7 ins. and a constant lead of 1/4 in. Walschaerts valve motion is applied, and is controlled by a power reverse mechanism. The piston rods, main crank pins and driving axles are heat treated and hollow bored.

These locomotives use oil for fuel, and the oil-burning equipment is arranged in accordance with the Railway Company's practice. The boiler has a deep, wide firebox which is placed over the rear truck, and has a combustion chamber 64 ins. in length. This not only provides ample furnace volume but also permits the use of tubes of reasonable length (21 ft.). The boiler barrel has a straight top with a slope on the bottom of the middle ring in order to provide a sufficiently deep water space under the combustion chamber. This increases the shell diameter from 90 ins. at the first ring to 100 ins. at the throat. The main dome is placed on the second ring, and the auxiliary dome on the third ring, immediately ahead of the combustion chamber. The latter dome carries the safety-valves, and is placed over a man-hole 15 ins. in diameter, so that the boiler can be easily entered for inspection purposes.

The boiler is fed by one non-lifting injector, placed on the right-hand side, and one combined feed-water heater and pump, of 7200 gallons capacity per hour, placed on the left-hand side. The pump is supplied by a steam-pipe leading from a valve in the turret, as shown in the left-hand view of the locomotive. This view also shows the steam pipe leading from the main dome to the "booster," an auxiliary engine attached to the rear truck for the purpose of increasing the tractive force at starting speeds.

The cab of this locomotive is comparatively short, but it has large window openings in the sides, and special attention has been given the arrangement of the fittings. The steam turret is placed outside the cab, and the various valves have extension handles which are clearly labeled. The lubricator has seven feeds, including those to the water pump and the booster engine.

The maximum width over the cab-boards is 10 ft. 10 ins., and the overall height of the locomotive is 16 ft. 4 ins.

The tender is notable, both because of its design and capacity. It is of the Vanderbilt type, carrying 4000 gallons of oil fuel and 12,000 gallons of water. The water tank has a diameter of approximately 8 ft. 6 ins., and an overall length of 36 ft. 7¾ ins. It is carried on a cast steel frame, made in one piece with the bumpers and the transverse bolsters which serve as tank supports.

The 2-10-2 type is a development of the Decapod (2-10-0) type. The addition of a two-wheeled rear truck materially improves the tracking qualities, especially when running backward, and allows the use of a larger boiler in proportion to the weight on drivers.

Left-hand Side

2-10-2 Type Locomotive for the Southern Pacific Lines

Baldwin Class 14-52-¼-F, 216

Railway Co.'s Class F-4

PRINCIPAL DIMENSIONS

CYLINDERS

Diameter	29½″
Stroke	32″
Valves	Piston, 15″ diam.

BOILER

Type	Straight top
Diameter	90″
Working pressure	200 lbs.
Fuel	Oil

Firebox

Staying	Radial
Length	132″
Width	90″
Depth, front	88¾″
" back	73″

Tubes

Diameter	5½″	2¼″
Number	50	261
Length	21′ 0″	21′ 0″

Heating Surface

Firebox	251 sq. ft.
Combustion chamber	130 sq. ft.
Tubes	4722 sq. ft.
Total	5103 sq. ft.
Superheater	1329 sq. ft.
Grate area	82.5 sq. ft.

DRIVING WHEELS

Diameter, outside	63½″
" center	56″
Journals, main	13″ x 22″
" front	11″ x 20″
" others	11″ x 13″

ENGINE TRUCK WHEELS

Diameter, front	33″
Journals	6″ x 12″
Diameter, back	45½″
Journals	9″ x 14″

WHEEL BASE

Driving	22′ 10″
Rigid	22′ 10″
Total engine	42′ 4″
Total engine & tender	82′ 7½″

WEIGHT

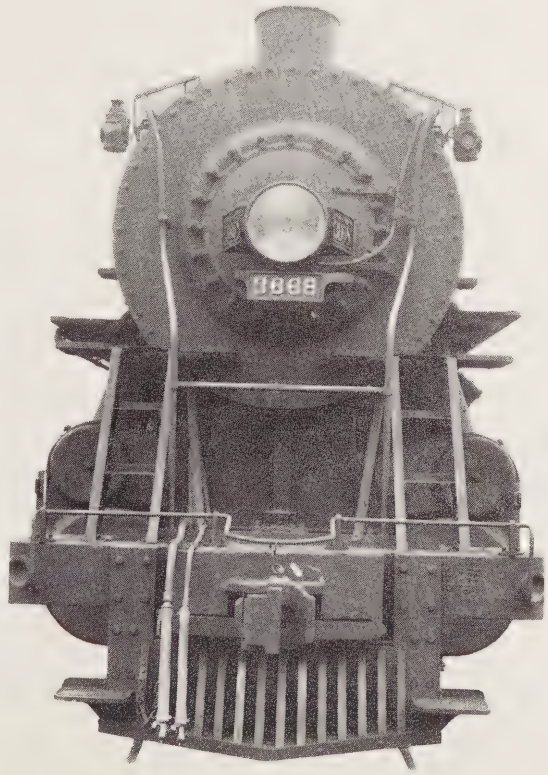
In Working Order

On driving wheels	306,000 lbs.
On truck, front	31,500 lbs.
" " back	60,500 lbs.
Total engine	398,000 lbs.
Total engine & tender	621,000 lbs.

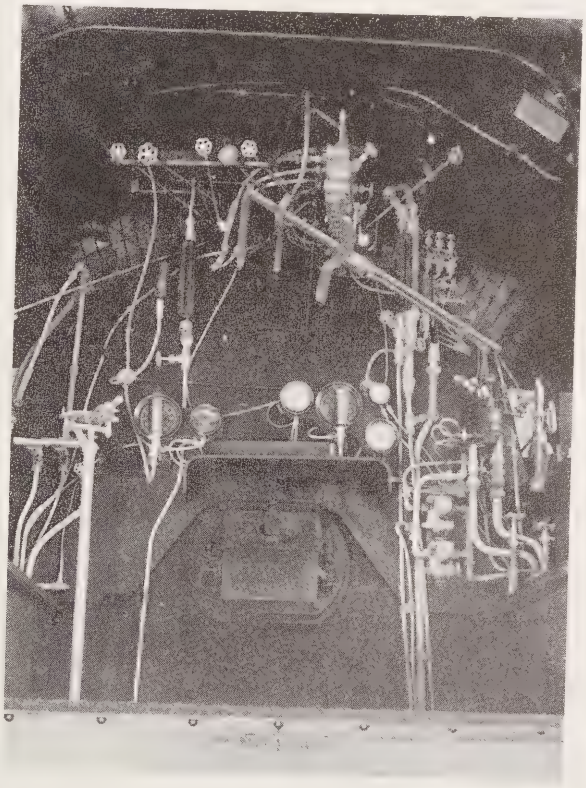
TENDER

Wheels, number	8
" diameter	33″
Journals	6½″ x 12″
Tank capacity, water	12,000 U. S. gals.
" " oil	4,000 U. S. gals.

Tractive force (without booster) 75,150 lbs.



Front View



Cab View

Fifty 2-10-2 Type Locomotives for the Southern Pacific Lines Ready for Shipment from the Eddystone Plant of The Baldwin Locomotive Works.

Mr. S. M. Vauclain, then President of The Baldwin Locomotive Works, realizing that the stimulating effect of such a large purchase of new equipment by one railroad would bolster up the spirit of the country, arranged to ship 20 of these locomotives across the continent in one solid train. Thus was dispatched the "Prosperity Special," the most notable train of railway motive power that ever moved, having a length, without the propelling locomotives, of nearly 2,000 feet and a weight of about 4,000 tons.

The importance of advertising a demonstration of this kind was fully realized; and before the trip was begun, civic officials of the towns along the route, Boards of Trade, Manufacturers' Associations, School Boards and the public press, were advised of the trip by means of suitable literature. The response was most gratifying; and newspapers in all parts of the country gave prominent space to the "Prosperity Special," following its movement across the Continent. It is safe to say that no other train has ever received so much publicity in a short period of time.

The "Prosperity Special" left the Eddystone Plant of The Baldwin Locomotive Works at noon on Friday, May 26th, after the conclusion of brief but appropriate exercises. A special train from Philadelphia, carrying several hundred invited guests, reached Eddystone at 11.25 A. M. The "Prosperity Special" was standing on a siding, ready to move, and beside it was the speakers' stand appropriately decorated. Mr. J. P. Sykes, Senior Vice-President in charge of Plant and Production of The Baldwin Locomotive Works, presided and first introduced Mr. Vauclain who spoke as follows:—

"Ladies and gentlemen, invited guests and fellow-workmen of The Baldwin Locomotive Works; this great demonstration which you witness today originated in a desire to show the people of the United States of America that business is not dead in our country as it is dead in many other parts of the world. It was done to inspire confidence among the people of this country, in other countries, and in yourselves, so that we may go forward to achieve our usual victory and have prosperity once more restored to those who of necessity are com-

The Speakers' Stand; Address of Mr. Vauclain

pelled to work day in and day out in order to supply themselves with the necessaries of life; and unless some demonstration of this kind is originated here and in other places, we will have a greater and larger period of poor times and reduced circumstances among ourselves.

"This demonstration is also intended to convey to every part of the world the fact that the two great shores of this country are in unison with each other; that one of the greatest railways on the Pacific Coast comes to one of the greatest locomotive works, The Baldwin Locomotive Works, on the Atlantic Coast to get its locomotives built, with every confidence that they will get the best that can be purchased for the least amount of money, which is what every man here must take to heart and realize; and that we among the large industries in the East are fairly prosperous today, notwithstanding the reduced circumstances which many of us are compelled to suffer.

"With a demonstration of this kind everybody in the United States will be awakened to the fact that there is something yet to live for. The utter distress that prevails on the other side of the ocean will also be partially relieved when the people there realize that we on this side are satisfied and hopeful, and can do things from time to time that will cause them to have a personal interest and rejoice that their conditions are no worse."

In order to give the greatest possible opportunity for people along the route to view the train, and to insure maximum safety, the "Prosperity Special" was moved in day-time only.

As it was specially desired to reach Los Angeles by July 1st, part of the trip between El Paso and that point was made at night. The times of arrival and departure at the principal points on this section of the run, were as follows:

Monday, June 26

Leave El Paso, Tex.	10.00 A. M.
Arrive Lordsburg, N. M.	10.00 P. M.

Tuesday, June 27

Leave Lordsburg, N. M.	5.40 A. M.
Arrive Tucson, Ariz.	11.50 P. M.

Wednesday, June 28

Leave Tucson, Ariz	10.00 A. M.
Arrive Gila, Ariz	9.00 P. M.
Leave Gila, Ariz	10.40 P. M.

Thursday, June 29

Arrive Yuma, Ariz.	10.30 A. M.
Leave Yuma, Ariz	12.01 P. M.
Arrive Indio, Cal.	9.35 P. M.
Leave Indio, Cal.	11.25 P. M.

Friday, June 30

Arrive Colton, Cal.	8.05 A. M.
Leave Colton, Cal.	11.00 A. M.
Arrive Los Angeles, Cal.	5.40 P. M.

The train of twenty locomotives was moved intact over this entire distance. From El Paso to Yuma it was accompanied by Division Superintendent W. Wilson, whose private car was attached; while Division Superintendent W. H. Whalen, in his private car, rode with the train from Yuma to Los Angeles. While ascending Beaumont Hill out of Yuma, the train was handled by seven locomotives; two Mikado type on the head end, one Mikado and one Consolidation behind the tenth dead engine, two Consolidations behind the fifteenth dead engine, and one Mallet behind the rear dead engine. Although this section of the country is sparsely settled, a remarkable amount of interest was taken in the train and many people came from considerable distances to see it pass through the towns en route. At Tucson, the Mayor made an address before the train left, and the Southern Pacific employes' band was present to enliven the occasion. Between Colton, Cal., and Los Angeles, 56 miles, the train was frequently stopped at stations for periods of ten to twenty-five minutes, and was inspected by large numbers of people.

At Salton, Cal., the train reached the lowest elevation on the entire run across the Continent; as the track at this point is 201.5 feet below sea level.

At Los Angeles the entire train stood in Exposition Park from the Friday evening when it arrived until the following Sunday evening. The location here was unusually favorable for inspection, and thousands of people viewed the locomotives, many coming to the city for that purpose from the surrounding country. An extensive celebration was held, attended by about 5000 persons. Addresses were made by Mr. Wm. Lacy, Vice-President of the Chamber of Commerce; City Councilman O. P. Conoway, and Assistant General Manager T. H. Williams, of the Southern Pacific. Mrs. Frank Walsh, a native of California, christened the train by breaking a bottle of grape juice on the leading engine, and, on behalf of the Railway Company, formally

accepted the locomotives from Mr. McCarroll, who represented The Baldwin Locomotive Works. It was a fitting termination of one of the most remarkable train movements ever undertaken in the history of American railroading.

The train was now finally divided, ten of the locomotives being prepared for service at Los Angeles, while the remaining ten were sent to Sacramento. These were moved on the following schedule:

Tuesday, July 4

Leave Los Angeles.....5.00 A. M.

Wednesday, July 5

Arrive Bakersfield.....6.00 A. M.
Leave Bakersfield.....9.30 A. M.
Arrive Fresno.....5.15 P. M.

Thursday, July 6

Leave Fresno.....4.30 A. M.

Friday, July 7

Arrive Sacramento.....8.00 A. M.

The total distance run by the train, from Eddystone to Los Angeles, was 3743 miles; and the average speed maintained, exclusive of stops, was approximately 11 miles per hour. The ten locomotives which were sent on to Sacramento covered an additional 472 miles, or a total of 4215. Throughout the entire run, the bearings kept cool and there were no mechanical troubles; a striking testimony to the excellence of the material and workmanship put into the locomotives, as well as to the care and skill with which they were handled on the road.

The "Prosperity Special" Pulled into Southern California June 30, 1922, and was Greeted by a Throng of 5,000. The Sensational Train was Acclaimed by the Press as Heralding A National Upswing in Business and Industrial Activity. Public Speech Making and a Christening by a Bottle of California Grape Juice Concluded the Event.

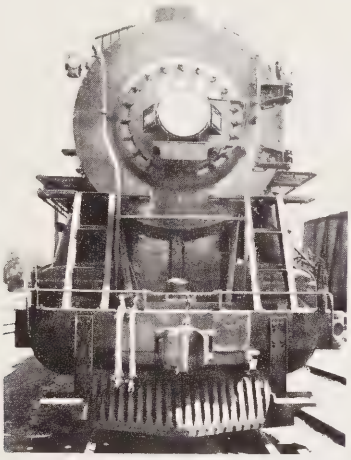
Courtesy Southern Pacific

Courtesy Southern Pacific

The tiny "C. P. Huntington" Alongside One of the "Prosperity Special" Locomotives. This Veteran Could Almost Fit into the Firebox of the Large Giant Without Choking the Draft.

Upon Delivery "Prosperity Special" Locomotives were Placed in Heavy Freight Service on all Divisions. This Stable Power Provided the Mainstay for Drag Freights up to the End of Steam. (BELOW) Refrigerator Block of Salinas Valley Lettuce Rolls Through Burbank and Eastward Toward Waiting Produce Markets.

H. L. Broadbelt



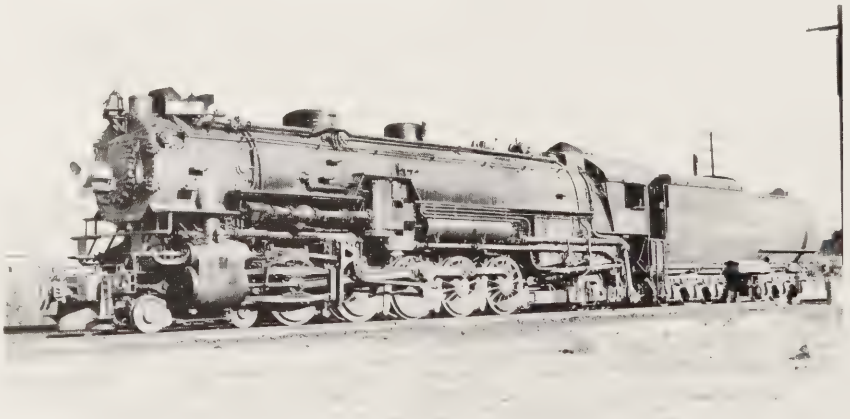
Donald Duke

Donald Duke

While the 2-10-2 engines were primarily designed for fast freight and used in passenger service only on the Sierra grade, they were the forerunners of the 4-10-2 type, a combined freight and passenger engine purchased by the Southern Pacific after a study of the developments in locomotive design both in this country and abroad. As a result of this study the railroad finally decided that a combination of a higher steam pressure, restricted maximum cut-off and the use of three cylinders was the most promising. Sixteen engines having these features were purchased from the American Locomotive Company in 1925, followed by additional orders for 33 more which were placed in 1926 and 1927. These were the largest and most powerful non-articulated locomotives built up to that time.

They had a 4-10-2 wheel arrangement, 225 pounds boiler pressure and a 70 per cent maximum cut-off. Developing a tractive force of 84,200 pounds exclusive of the "booster" engine, they exceeded the 2-10-2 locomotives by 12 per cent, yet due to the lighter reciprocating parts and lower adhesion resulting from the use of three cylinders, they were only 3.2 per cent heavier on the drivers than the 2-10-2 engines. The inside valve was driven by the Gresley valve gear developed on the Great Northern Railroad of England and re-designed by the American Locomotive Company to suit American practice. These locomotives were equipped with the throttle valve located in the smokebox, feed water heater and "booster" engine attached to a Delta type trailing truck. Since the Southern Pacific Company was the first railroad to have built a 4-10-2 wheel arrangement the type was designated as the "Southern Pacific Type."

The increased speed obtained with the three-cylinder engines, which were able to handle at 10 miles per hour the same weight of train that the Mallets could drag at only 8 miles per hour, led Mr. George McCormick, General Superintendent of Motive Power, to consider the possibility of rejuvenating the Mallets with the idea of injecting more speed into them. The feed water



Three-cylinder Locomotive: Built by the American Locomotive Company in 1925

Donald Duke

heater was removed and the boiler tubes extended through to the smokebox. The 26″ diameter high-pressure cylinders were bushed down and the 40″ diameter low-pressure cylinders replaced with 22″ diameter cylinders. At the same time the boiler pressure was increased from 200 to 210 pounds.

A series of tests conducted with these rebuilt locomotives showed that they could handle the same tonnage as the three-cylinder locomotives at slightly less than 15 miles per hour.

Time Freight No. 864 with Two Three-Cylinder Monsters Chugs Out of Tucson, Arizona, with Refrigerated Cargo. Note the Ice Plant Crews Climbing Cars to Button Down Open Hatches. (ABOVE—PAGE LEFT) A 4-10-2 Type Heads a Train of Redball Freight Across the Rich Sacramento Valley with No. 5012.

4-10-2 3-CYLINDER TYPE

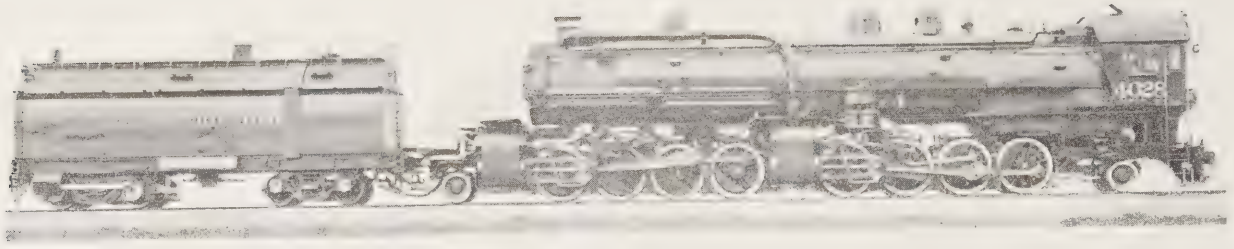
Rising Pillars of Steam and Oil Smoke Pile High Into the Clear California Sky as No. 5012—a Three-Cylinder Southern Pacific Type Battles a Fruit Block Through Pomona Valley.

Donald Duke


5012

Courtesy D. L. Joslyn

A 70-car Stock Train Wheeled by Cab-in-Front No. 4100 Heads Down the Truckee River Canyon in 1929.



Single Expansion 2-8-8-2 Type Locomotive, Southern Pacific Lines

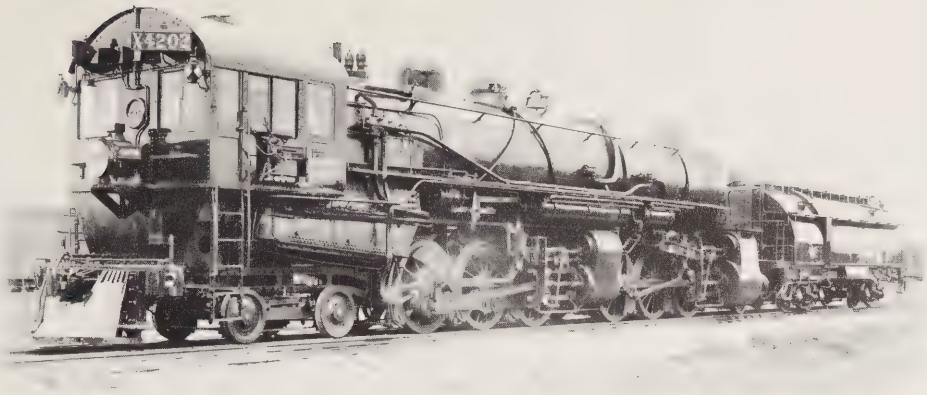
Cylinders (4)	22″ x 30″	Superheating surface	2150 sq. ft	Weight, total engine (est.)	478,000 lb.
Drivers, diam.	57½″	Wheel base, driving	39′ 4″	" " " and tender (est.)	723,000 lb.
Steam pressure	210 lb.	" " total engine	56′ 7″	Tractive force, engine only	90,940 lb.
Grate area	68.4 sq. ft.	Weight on drivers (est.)	437,000 lb.	" " with tender booster	105,140 lb.
Water heating surface	4904 sq. ft.				

Originally built as a compound locomotive by The Baldwin Locomotive Works in 1911. Subsequently rebuilt by the Railway Company.

Principal Dimensions and Tonnage Ratings of Locomotives Used on the Sierra Grade

	2-8-0 Consolidation Type	2-8-8-2 Type, Compound Mallet	2-8-8-2 Type, Single Expansion	4-6-6-2 Type, Compound Mallet	4-6-6-2 Type, Single Expansion	2-10-2 Type	4-10-2 Type, 3-Cylinder	4-8-8-2 Type, Single Expansion
Cylinders	22″ x 30″	26″ and 40″ x 30″	(4) 22″ x 30″	25″ and 38″ x 28″	(4) 22″ x 28″	29½″ x 32″	(1) 25″ x 28″ (2) 25″ x 32″	(4) 24″ x 32″
Steam pressure, lb.	210	200	210	200	210	200	225	235
Driving wheels, diam.	57½″	57½″	57½″	63½″	63½″	63½″	63½″	63½″
Weight—Engine, total, lb.	220,000	435,820	478,000**	396,900	417,500**	397,900	445,000	614,600
Tender, lb.	180,000	189,180	245,000	189,180	225,000	246,200	291,100	292,300
Engine and tender, lb.	400,000	625,000	723,000	586,080	642,500	644,100	736,100	906,900
Tractive force, main cylinders, lb.*	45,500	85,040	90,940	65,920	74,080	75,150	84,200	112,760
Tractive force, booster, lb.	.....	.....	14,200	.....	.....	10,950	12,330	.....
Tonnage rating, tons:								
Roseville–Colfax	840	1,625	1,625	1,225	1,225	1,365	1,575	2,050
Colfax–Summit	565	1,100	1,100	815	815	910	1,050	1,375

* Based on driving wheels 57″ and 63″ in diameter.
** Estimated weights.



Courtesy Guy L. Dunscomb

A 4-6-6-2 Type Locomotive for Passenger Service, Originally Built by The Baldwin Locomotive Works as a 2-6-6-2 Type

Cylinders, H.P.	25″ x 28″
Cylinders, L.P.	38″ x 28″
Steam pressure	200 lb.
Drivers, diam.	63″
Heating surface	7,117 sq. ft.
Grate area	70 sq. ft.
Weight on drivers	320,100 lb.
Weight, total engine	384,800 lb.

Courtesy H. L. Broadbelt

The First 4-8-8-2 Single Expansion Articulated Cab-in-Front Constructed by Baldwin in 1928. Here No. 4100 Awaits on the Delivery Track for Shipment to Southern Pacific.

The success of the simpled Mallets naturally led to the consideration of larger single expansion articulated locomotives especially designed to meet the difficult operating conditions encountered in crossing the Sierra Nevada Mountains where it is said that the snow fall is heavier than at any other place on the Western Hemisphere. To meet these conditions the railroad's Motive Power Department, in conjunction with The Baldwin Locomotive Works, designed a 4-8-8-2 single expansion articulated locomotive having the cab located at the front end the same as on the Mallets. Ten of these engines were purchased in 1928 and 16 more the following year. They were originally built with the valves set at 70 per cent maximum cut-off developing 112,760 pounds tractive force but this was later changed to 81.6 per cent, which increased the tractive force to 116,900 pounds. A further order for 25 more was placed in 1930. These latter engines were slightly heavier and, with the boiler pressure increased to 250 pounds, they developed 124,-300 pounds tractive force.

In addition to heat-treated wheels, which are standard on all Southern Pacific locomotives, tenders and passenger cars, several of these heavy articulated engines were recently equipped with Standard Steel Works Company's heat-treated tires.

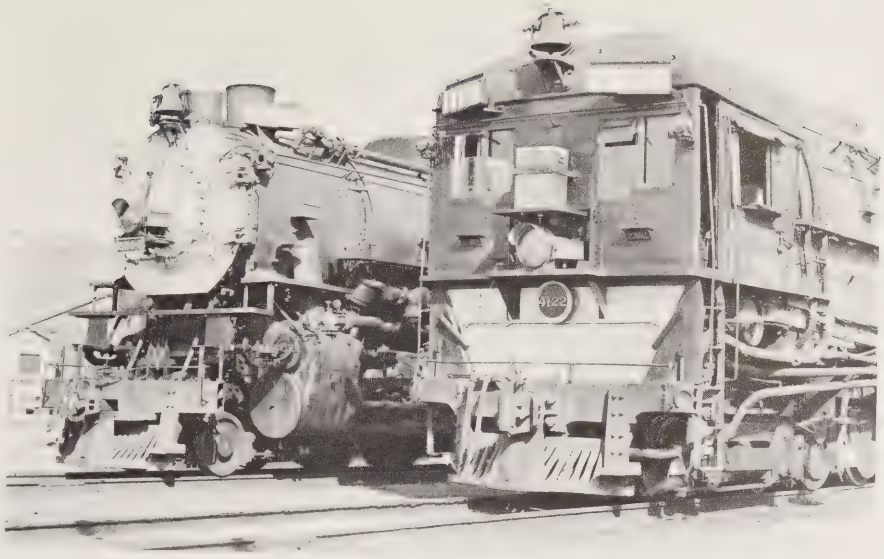
When the last lot of articulated locomotives was delivered at Sacramento it so happened that one of them was placed alongside the little *C. P. Huntington*, which had recently been on exhibition, and while the claim of one of the shopmen that you could "put the tiny veteran engine into the firebox of the large locomotive without even choking the draft," is a trifle exaggerated, it is interesting to compare the little engine of 1864 with the modern monster of 1930—

	C. P. Huntington S. P. No. 1	*Class AC-6 S. P. No. 4126-4150*
Cylinders	11″ x 15″	(4) 24″ x 32″
Cylinder volume	1.65 cu. ft.	33.52 cu. ft.
No. of drivers	2	16
Weight on drivers	18,500 lb.	517,000 lb.
Total weight engine and tender	39,000 lb.	935,500 lb.
Steam pressure	125 lb.	250 lb.
Tractive force	3,510 lb.	124,300 lb.
Total heating surface	419 sq. ft.	6,505 sq. ft.
Total wheel base	21′ 2″	106′ 11¼″
Water capacity	300 gals.	16,152 gals.
Fuel capacity	¾ cord wood	4,889 gals. oil

This comparison illustrates the immense

A 4-8-8-2 Cab-in-Front Locomotive with a Mile Long Freight Drag Twists Around the Spiral Tehachapi Loop Seeking the Summit at Tehachapi Station. (BELOW) Throughout the Closing Decades of Steam the Ruling Motive Power for Southern Pacific was the Giant Cab-in-Front. No. 4105 with Train No. 810 Climbs the Curved Track Lifting it from Antelope Valley at Palmdale. While Below Train No. 26 the San Francisco-Los Angeles Passenger Attacks Tehachapi Grade near Mojave During the Early 1940's.

All Pacific Railway Journal



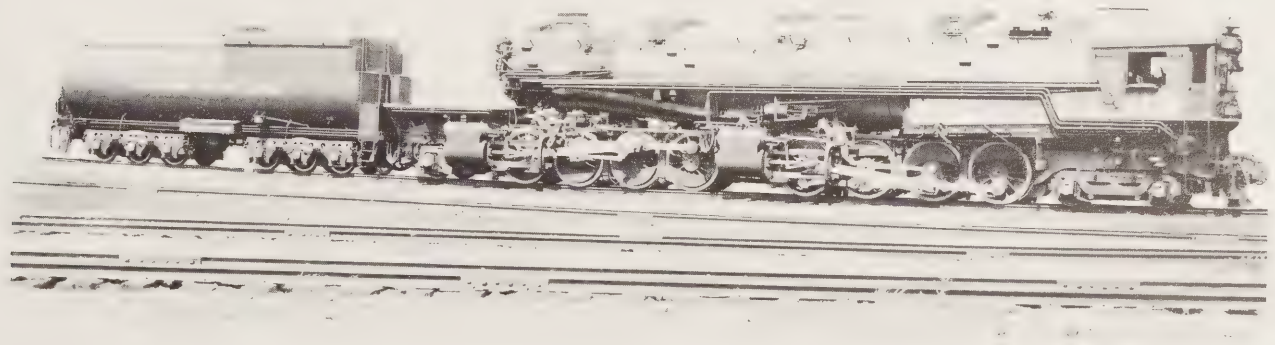
A southern Pacific Locomotive Personified the Finest Steam Power Whether in Design or Performance. The 5000 Class Three-Cylinder Locomotive was Named the "Southern Pacific" Type While the Cab-in-Front was the Outgrowth of Superior Southern Pacific Engineering. Two of These Developments Photographed Together at Los Angeles Taylor Yards.

Donald Duke

progress made during the past 66 years in the generation of the steam and also in putting this steam to work. With the increase in the size and power of the modern locomotive, came higher steam pressures combined with a greater degree of superheat which has materially reduced the rate of combustion. The engine of today consumes on an average 40 per cent less fuel per square foot of grate area than an engine built 25 years ago, and in addition can realize as much as 50 per cent more work from each pound of steam.

This development has made uneconomical the continued operation of obsolete engines, on account of their low thermal efficiency and constantly increasing repair costs. The increased capacity of the modern locomotive has permitted the steady stepping up of average freight train speeds and the maintaining of precise schedules which has further cut down operating costs through the reduction in the number of trains.

Both the three-cylinder and single expansion articulated locomotives proved to be equally satisfactory for either freight or passenger service. Before the advent of these powerful high-speed engines it was customary to handle the Overland passenger trains on heavy grades with locomotives having a typical freight engine wheel arrangement but with larger diameter drivers and greater boiler capacity than were customary for standard freight engines of that period. It is interesting to note that, with the recent development throughout the country of faster schedules for handling freight, the modern freight locomotive combines the features previously developed by the Southern Pacific for passenger service.



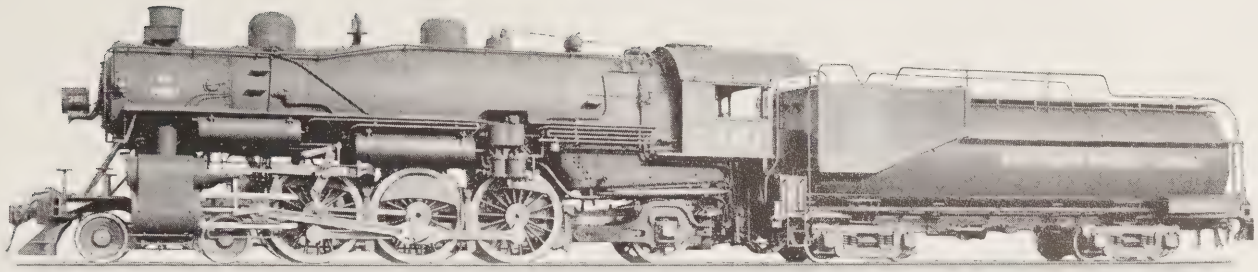
One of the Single Expansion 4-8-8-2 Type Locomotives, Built by The Baldwin Locomotive Works in 1930

Cylinders (4)	24″ x 32″	Heating surface	6,505 sq. ft.	Weight on drivers	517,000 lb.
Steam pressure	250 lb.	Superheating surface	2,988 sq. ft.	Weight, total engine	639,500 lb.
Drivers diam.	63½″	Grate area	139 sq. ft.	Tractive force	124,300 lb.

Through the Heart of the Tehachapi Mountains . . . Not Around 'Em

Courtesy Ed Cheetham

The Name "Overland Limited" is Only Slightly Less Old and Romantic in Railroad Legend Than the Golden Spike. It was the Pride of the Line and its Equipment Built Especially by Pullman was the Ultimate of Car Builders Know-How. Generations Stirred Among the Stately Consist of Thick Carpets and Overstuffed Armchairs and Picked up Cinders and Dust While Riding the Big Observation Deck as the "Overland Limited Raced West.



Pacific Type Locomotive, Class P-8, Southern Pacific Co. Built 1921

Cylinders	25″ x 30″	Tubes, number	5½″, 40; 2¼″, 193	Wheel base, driving	13′ 0″	Weight, total engine	297,800 lb.
Drivers, diam.	73½″	" length	18′ 0″	" " total engine	35′ 6″	" " " and tender	519,800 lb
Boiler, diam.	78″	Grate area	70.4 sq. ft.	" " " " and tender	75′ 9½″	Tank capacity, water	12,000 U. S. gal.
Steam pressure	200 lb.	Water heating surface	3,352 sq. ft.	Weight on drivers	180,000 lb.	" " oil	4,000 " "
Firebox	120⅝″ x 84″	Superheating surface	867 sq. ft.			Tractive force	43,600 lb
Tubes, diam.	5½″ & 2¼″						

Conditions on the Southern Pacific Lines were generally favorable for making long locomotive runs when oil was used for fuel. Owing to the varying topography of the country traversed, it was not always practicable to run locomotives as far as would be possible were grades, etc., more uniform.

On the Salt Lake Division of the system, passenger locomotives made continuous runs between Sparks, Nevada, and Ogden, Utah, a distance of 536 miles. This run was inaugurated early in 1922, previous to which time locomotives were changed at Carlin, Nevada, 247 miles from Ogden; and engine and train crews were also changed at this point. This division had maximum ascending grades of 1.5 per cent, ten miles of which were encountered eastbound and twenty miles westbound. The remaining grades varied from 0.15 to 0.60 per cent. The principal trains operating in this service, and the scheduled speeds including stops, were as follows:

Train	Between	Time	Schedule Speed
No. 1, Overland Limited,	Ogden & Sparks,	14 hrs. 40 min.,	35.6 m.p.h.
No. 9, Fast Mail,	" " "	13 " 33 "	39.5 "
No. 19, Pacific Limited,	" " "	15 " 15 "	35.1 "
No. 2, Overland Limited,	Sparks & Ogden,	15 " 10 "	35.3 "
No. 20, Pacific Limited,	" " "	15 " 10 "	35.3 "
No. 22, St. Louis Express,	" " "	16 " 20 "	32.8 "

The locomotives used on this run were of the Pacific type, Class P-8, built by the Baldwin Locomotive Works in 1921. These locomotives were specially designed to run on this division, and the service they performed was most satisfactory. The piston stroke (30 inches) was unusually long for a Pacific type locomotive. It was adopted

The "Overland Limited" on the Salt Lake Division, Southern Pacific System

Courtesy Adams Collection

Heading South from Portland, Oregon, Train No. 17 with a Heavy Atlantic Type on the Head End Paused at Willsburg Junction During 1921 for a Clear Board. (RIGHT) Local Train No. 19 Moves South from Portland Toward Clackamas About 1915.

after making careful tests with previous locomotives, as most suitable for the speeds at which these locomotives operated when ascending long grades.

These locomotives had extended wagon top boilers with combustion chambers 36 inches long. The throttle was of the Rushton type with auxiliary drifting valve. Walschaerts valve motion was used, and was controlled by a power reverse mechanism; and the driving axles, main crank and piston rods were hollow-bored and heat-treated.

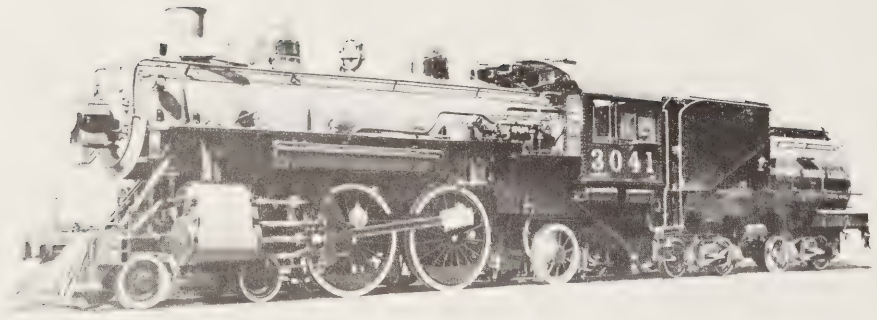
In service, these locomotives were capable of maintaining on-time schedules over the entire division without assistance even when handling trains of eleven cars weighing 875 tons.

Baldwin locomotives of the Atlantic and Pacific types, built during the years 1906 to 1912 were used between Oakland and Bakersfield, California, without changing engines. There were two routes between these points, one 309 miles and the other 312 miles in length. The maximum grade was 0.38 per cent, however grades were frequent.

On the Texas and Louisiana lines between New Orleans and Houston, some 362 miles, Trains 101 and 102 the "Sunset Limited" made this run at an average speed of 35 miles per hour. A typical make up of the "Sunset Limited" was a Pacific type class P-5, one baggage car, five sleepers and one diner. Between Houston and Del Rio, Texas, 378 miles, the "Sunset Limited" made this run behind an Atlantic originally built to use saturated steam, however, they were re-built with superheaters.

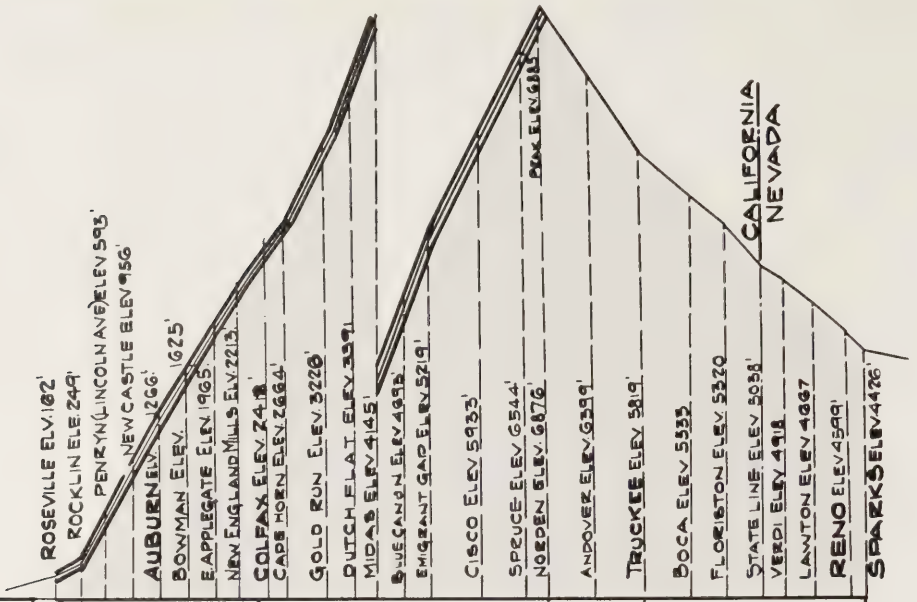
Many of the Atlantic type locomotives built by the Baldwin Locomotive Works saw local and main line service between Portland, Oregon, and way points down the Willamette Valley to Eugene. Electrification of secondary lines and branches caused discontinued use of steam power on local trains.

The "Sunset Limited" en route between New Orleans and Houston, Southern Pacific System



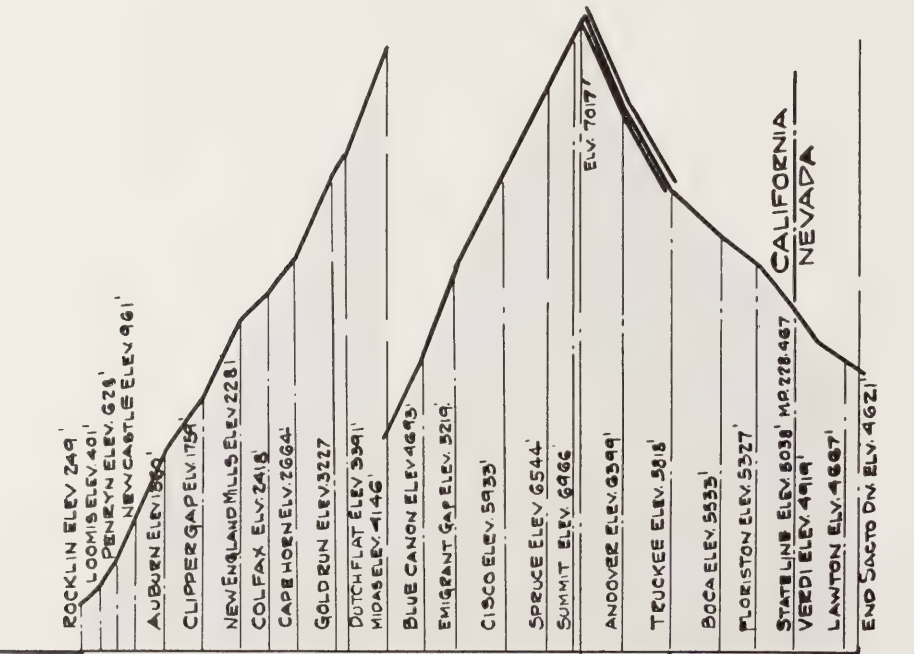
Atlantic Type No. 3041 After 1920 Rebuilding and Modernization was Completed at Sacramento Shops. (RIGHT) Surging over Heavy Rails a Local Passenger Behind No. 2274 Battles a Slight Grade Along the Rolling Oregon Countryside.

Courtesy Adams Collection



RULING GRADE FEET PER MILE		46	79	140	123	84	
DISTANCE FROM SAN FRANCISCO MILES		100	20 30 40	50 60 70 80 90	200	10 20 30 40	
CURVED LINE (MILES)	FROM 0° to 6° Incl.	168	13.933	13.177	4.504	16.412	2243
	" 6°01" 8° "			3.533	0.905	1.426	
	" 8°01 10° "			4.708	1.050	0.236	
	" 10° AND OVER "			0.457	0.103		
TOTAL ASCENTS EAST FEET		898	2171.7	4491.2	—	58	
" " WEST "				25.2	1067.8	1207.6	1956
" CURVATURE		5° 30'	1340°17'	8 802°15'	1498° 58'	3062°34'	4925

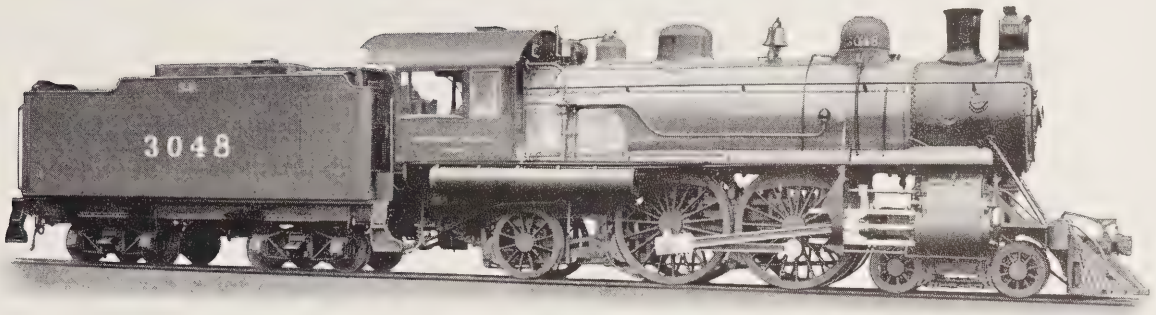
Eastbound Track



RULING GRADE FEET PER MILE		140			123	60
DISTANCE FROM SAN FRANCISCO MILES		120 130 140	150 160 170 180	190	200	210 220 230
CURVED LINE (MILES)	FROM 0° TO 6° INCL.	14.247	12.459		4.217	17.381
	" 6°01 " 8° "	2.485	5.992		2.044	0.983
	" 8°01 " 10° "	2.268	5.754		1.770	0.286
	" 10° AND OVER	0.069	0.244		0.113	—
TOTAL ASCENTS EAST FEET		2175.8	4627.4		—	—
" " WEST "		6.4	25.2		1200.5	1199.8
" CURVATURE		4235°45'	9127°40'		2142°20'	2697°01'

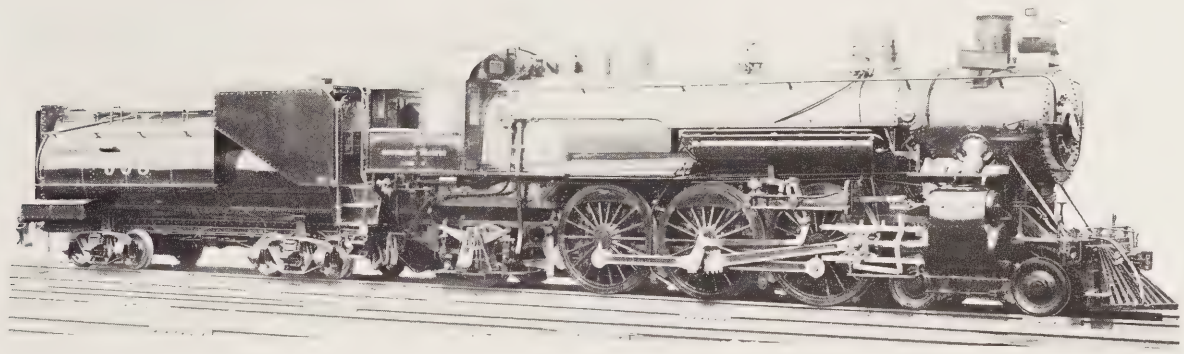
Westbound Track

Profile of Line over Sierra Nevada Mountains



Atlantic Type Locomotive, Southern Pacific Co. **As originally built in 1906, to use Saturated Steam**

Cylinders	20″ x 28″	Tubes, diam.	2″	Wheel base, driving	7′ 0″	Weight, total engine	196,000 lb.
Drivers, diam.	81″	" number	297	" " total engine	27′ 7″	" " " and	
Boiler, diam.	70″	" length	16′ 0″	" " " " and		tender	355,000 lb.
Steam pressure	200 lb.	Grate area	49.5 sq. ft.	tender	58′ 2″	Tank capacity, water	9,000 U. S. gal.
Firebox	108″ x 66″	Water heating surface	2,655 sq. ft.	Weight on drivers	105,000 lb.	" " oil	2,835 " "
						Tractive force	23,500 lb.



Pacific Type Locomotive, Class P-5, Southern Pacific Co. Built 1912

Cylinders	22″ x 28″	Tubes, number	5⅜″, 24; 2″, 173	Wheel base, driving	13′ 4″	Weight, total engine	221,100 lb.
Drivers, diam.	77″	" length	20′ 0″	" " total engine	33′ 4″	" " " and	
Boiler, diam.	70″	Grate area	49.5 sq. ft.	" " " " and		tender	382,000 lb.
Steam pressure	200 lb.	Water heating surface	2,658 sq. ft.	tender	68′ 6¼″	Tank capacity, water	9,000 U. S. gal.
Firebox	108″ x 66″	Superheating surface	580 sq. ft.	Weight on drivers	141,500 lb.	" " oil	2,940 " "
Tubes, diam.	5¾″ & 2″					Tractive force	30,000 lb

Ten-wheeled Locomotive, Southern Pacific Co.

Cylinders	22″ x 28″	Tubes, number	5⅜″, 28; 2″, 204	Wheel base, driving	13′ 10″	Weight, total engine	208,750 lb.
Drivers, diam.	63″	" length	15′ 0″	" " total engine	25′ 10″	" " " and	
Boiler, diam.	72″	Grate area	32.1 sq. ft.	" " " " and		tender	346,000 lb.
Steam pressure	200 lb.	Water heating surface	2,402 sq. ft.	tender	58′ 0¼″	Tank capacity, water	7,000 U. S. gal.
Firebox	124″ x 37¼″	Superheating surface	483 sq. ft.	Weight on drivers	162,500 lb.	" " oil	2,940 " "
Tubes, diam.	5⅜″ & 2″					Tractive force	36,500 lb.

Donald Duke

Second Section of No. 99 the "Coast Daylight" Hits 80 MPH Through Palm Lined San Fernando Valley as it Nears Chatsworth on the San Francisco Run. (RIGHT) During 1938 Train No. 51 Curved Away from Saugus and Soon Traveled Over Tehachapi Loop and up the San Joaquin Valley enroute to the Oakland Mole. A Few Years Later Train No. 51 Received Streamlined Red and Orange Equipment and was Named the "San Joaquin Daylight".

Pacific Railway Journal

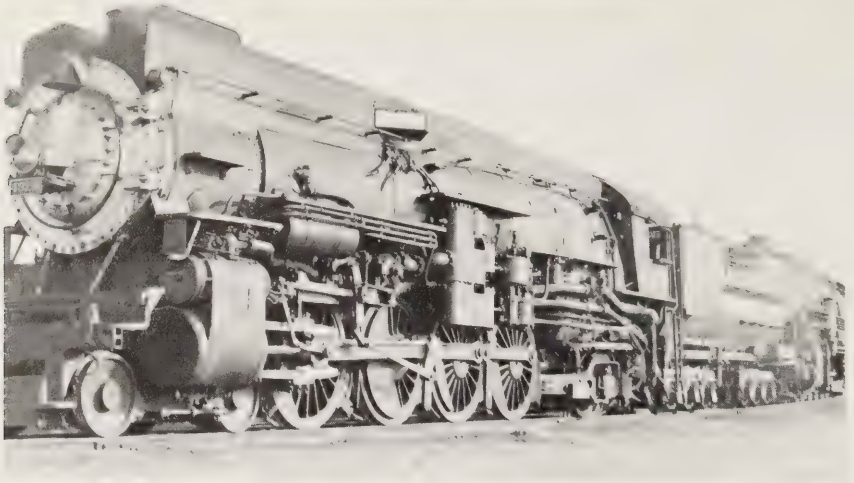
During 1923, the Southern Pacific placed an order with American Locomotive for 10 Mountain or 4-8-2 type locomotives. While a total of 28 of these were purchased from American by 1924, the railroad later built 49 more of this type in their own shops.

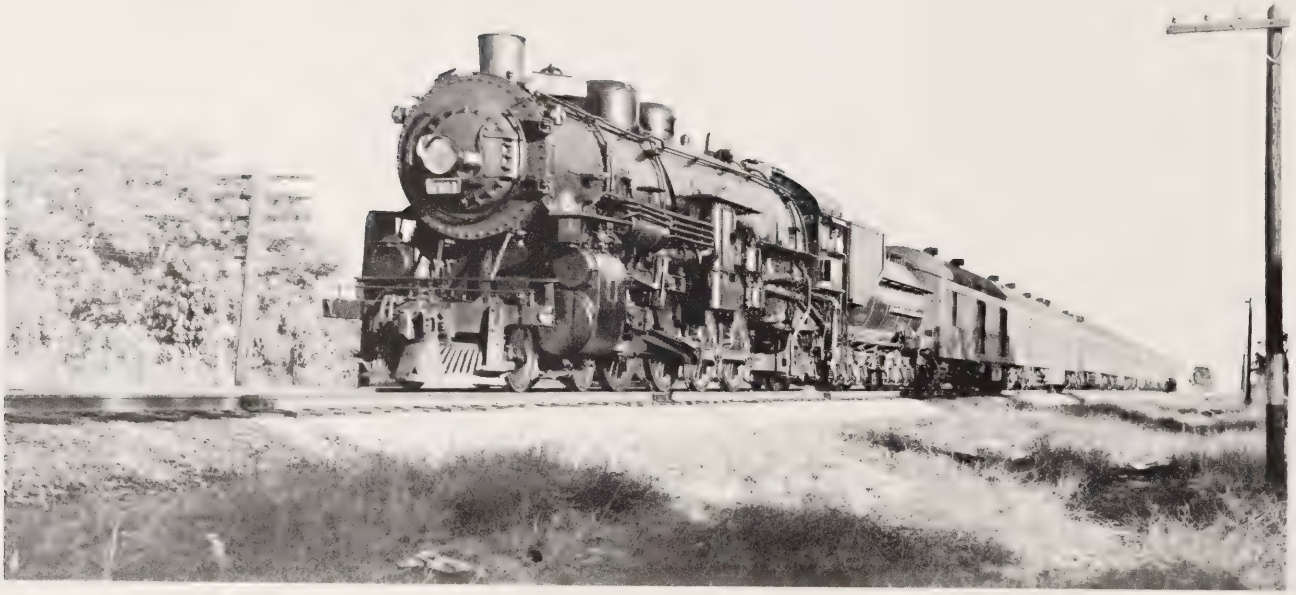
The 4300 class locomotives were graceful and speedy. They were equipped with all the latest appliances including superheaters, boosters, latest type air brakes, newest type force-feed driving axle lubrication system, plus a new and larger cylindrical tender with six-wheel trucks.

Later on, some of these Mountain type locomotives had the so called "skyline" casing applied when the engines were in for rebuilding or overhauling. The skyline casing gave the engine a streamlined effect, however, was used as a smoke lifter. In drifting, and when working light steam, the hot gasses and steam would be drawn around the boiler and drift down into the cab. With the casing, the smoke would simply drift along the top of the "skyline" and over the top of the cab.

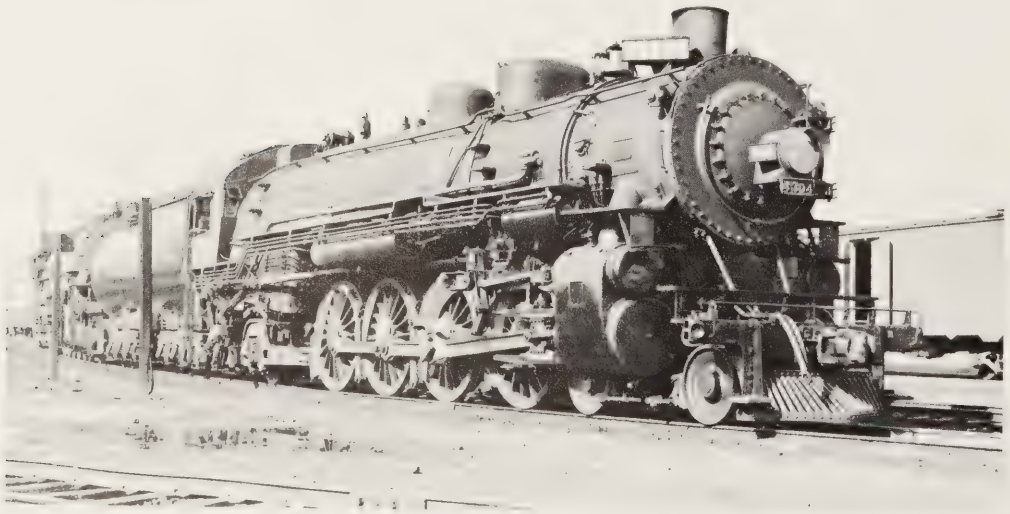
With the building of 4376, all new locomotive construction ceased at the Sacramento Shops, although a great deal of rebuilding and modernizing was carried on until the end of steam.

A refinement of the 4-8-2 type was built in 1930 when an order was placed with the





All Pacific Railway Journal



Today the Streamlined "Sunset Limited" Rolls Coast to Coast via the Old South Behind Modern Diesel Motive Power. Twenty Years ago the "Sunset Limited" was a Proud Train in Pullman Green as it Raced Eastbound from Los Angeles Behind a Powerful 4-8-2 Type. (BELOW) Complete with "Skyline" Casing No. 4307 Moves the Coast Mail Through the Colorful Chatsworth Rocks Edging San Fernando Valley. (TOP—LEFT PAGE) American Locomotive 4-8-2 with Semi-Streamlined Casing Applied. (CENTER) Westbound "Sunset Limited" with 12 cars of Pullmans Steams Toward its Final Destination During the Late 1930's.

Pacific Railway Journal

Donald Duke


4233
702

Donald Duke

Train No. 43, the Working Passenger on the Golden State Route, Pulls Across the Diamonds of Mission Tower as it Stands Guard over Terminal Traffic at Los Angeles Union Station. (LEFT) Baldwin Built 4-8-4 Numbered No. 702 in the Texas & New Orleans series Assists No. 4332 With an Extra at Searles Junction on the Owens Valley Branch.

Baldwin Locomotive Works for 14 locomotives of the 4-8-4 type. This was the first of the famous "General Service" or GS-1 class. The application of a 4-wheeled trailing truck permitted an increase in the size of the firebox. At the same time, the boiler pressure was raised from 210 to 250 pounds.

The average load carried on each pair of driving wheels was 65,500 pounds and the maximum tractive force exerted by the main cylinders was 60,000 pounds. This was based on a cut-off in full gear of 73½ per cent, and a mean effective pressure equal to 80 per cent of boiler pressure. To this a booster, mounted on the rear axle of the trailing truck, added 12,330 pounds making the total maximum tractive force 72,330 pounds.

These locomotives were designed to traverse curves as sharp as 18 degrees. Instead of separate frames and cylinder, a one piece bed was used in this design. This was the first Southern Pacific locomotive type to use this new one piece casting with cylinders cast integral. Apart from this, the machinery and running gear call for no special comment. A light design of Walschaerts valve motion was also applied.

Saturated steam was used for the injector, steam heat, hydrostatic lubricator, and power reverse; and superheated steam for the oil burning equipment, feed-water heater pumps, air pumps, booster and whistle.

Ten of these locomotives received road numbers 4400 to 4409, while the remaining four were assigned the 700 class numbers on the Texas & New Orleans Railroad, a Southern Pacific subsidiary.

At first, the new locomotives had a tendency to jump the rails at odd times until it was learned that the trailing truck under the cab had been mounted in a backwards position. The new 4-8-4 design provided excellent service after this error was corrected.

One of Fourteen 4-8-4 Type Passenger Locomotives, Built for the Southern Pacific Lines by The Baldwin Locomotive Works in 1930

Cylinders	27″ x 30″	Superheating surface	2,565 sq. ft.	Tractive force	62,200 lb.
Steam pressure	250 lb.	Grate area	90.4 sq. ft.	Tractive force of booster	13,710 lb.
Drivers, diam.	73½″	Weight on drivers	262,000 lb.	Tank capacity, water	16,152 U. S. gal.
Heating surface	4,856 sq. ft.	Weight, total engine	442,300 lb.	Tank capacity, oil fuel	4,692 U. S. gal.

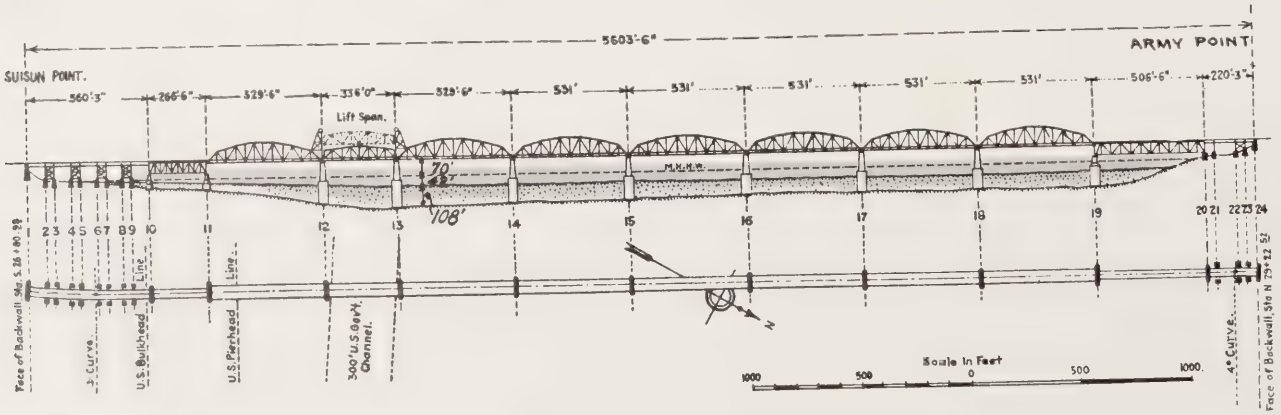
A Train Crossing the Martinez-Benicia Bridge on October 20, 1930, Just Five Days After the Last Rail was Laid

Since 1868, when the first effort was made to connect Sacramento with San Francisco by rail, the waters of the bay have presented a problem which has been temporarily met in several ways. The final solution, in so far as this and many succeeding generations are concerned, has been supplied by the building of the mammoth steel and concrete railroad bridge between Benicia and Martinez, spanning the western entrance to Suisun Bay.

The building of this bridge was not the result of any hasty decision on the part of the Railroad Company, but followed years of careful planning. When the freight and passenger traffic over this line reached a point where the bridge was economically justified, the Southern Pacific Company was in a position to proceed without further delay.

Let us consider for a moment the history of the Overland Route, and the events leading up to the construction of the Martinez-Benicia bridge. It was in 1863 that the old Central Pacific, the parent company of the Southern Pacific, started the construction of its line from Sacramento toward the east, a line which in 1869 met the Union Pacific at Promontory, Utah, 690 miles from Sacramento. In 1868 a second line was started from Sacramento, extending toward the southwest and finally terminating at South Vallejo on the shores of San Francisco Bay. From this point the steamer "*Yosemite*" carried passengers and freight down the bay to San Francisco.

In 1869 an all-rail route was established



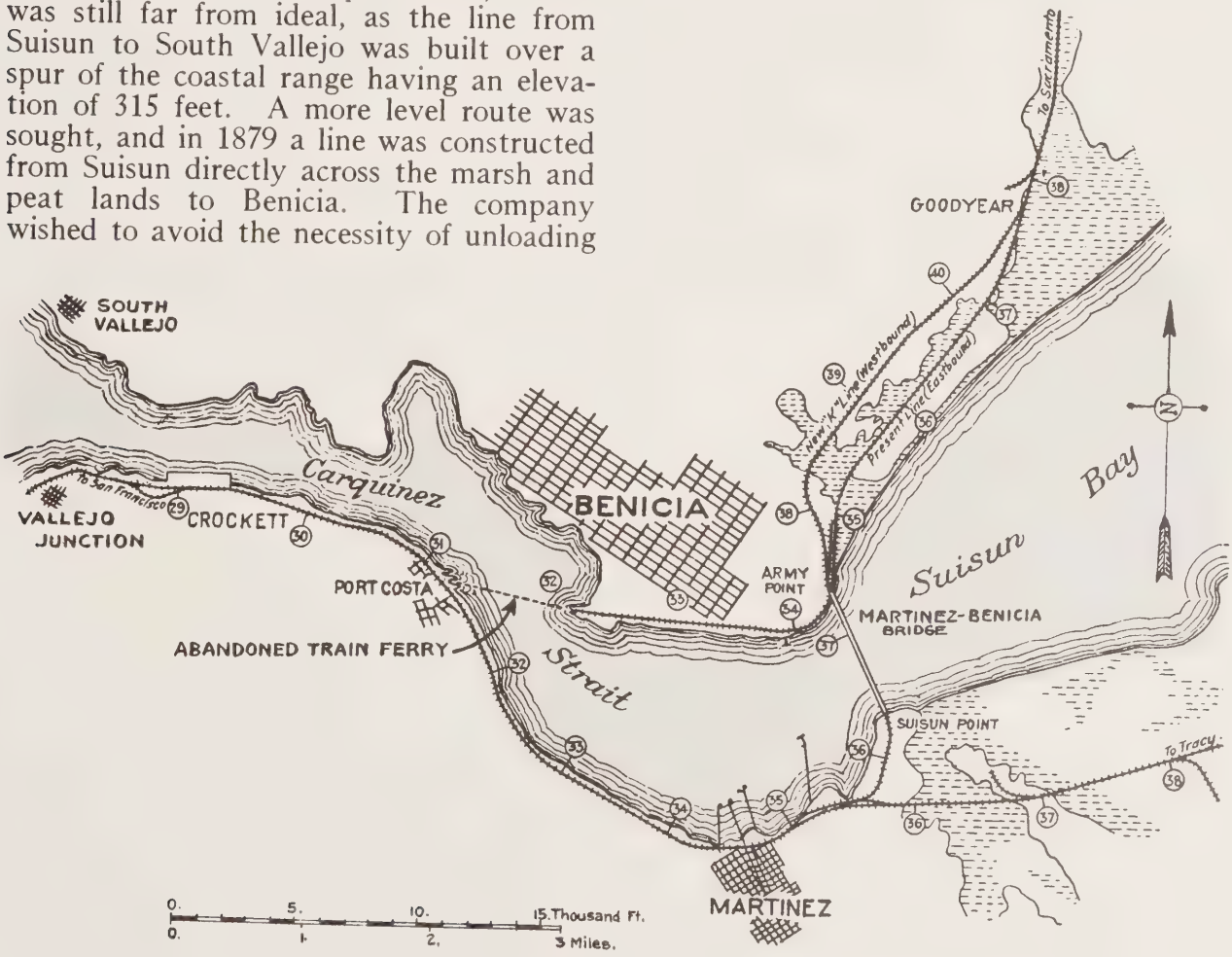
Sketch Showing the General Plan of the Martinez-Benicia Bridge and Indicating the Location of the Lift Span

between Sacramento and Oakland and the ferry service between Oakland and San Francisco completed the journey. This rail line, however, ran far to the south by way of Tracy and Altamont Pass, making the distance between Sacramento and Oakland approximately 150 miles.

In 1878 a rail line was built from Oakland to Martinez and, in the same year, it was continued to Tracy. With this new line available along the eastern and southern shores of the bay, it was decided to establish a ferry service across Carquinez Strait to connect this line with South Vallejo. The steamer line between South Vallejo and San Francisco was, therefore, discontinued and passengers and freight were carried by ferry boats from South Vallejo to Vallejo Junction, where they once more entrained for Oakland.

This route was a step forward, but it was still far from ideal, as the line from Suisun to South Vallejo was built over a spur of the coastal range having an elevation of 315 feet. A more level route was sought, and in 1879 a line was constructed from Suisun directly across the marsh and peat lands to Benicia. The company wished to avoid the necessity of unloading passengers and freight for the trip across the bay, and the question of a bridge was discussed, but such a project was not considered feasible at that time.

A train ferry seemed to be the only alternative, and in 1879 the "*Solano*," at that time the largest train ferry in the world, was placed in service between Benicia and Port Costa. The "*Solano*" was designed and built by Arthur Brown, at that time Superintendent of the Bridge and Building Department of the Central Pacific Company. The design was unique, as it applied, for the first time, the principle of a truss bridge to the construction of the hull. This boat had a displacement of 5450 tons, a length of over 420 feet and a width of 116 feet. Two vertical-beam



Map Showing Location of the Martinez-Benicia Bridge and the Ferry Lines which Preceded It

In 1869 a railroad was built from Sacramento to South Vallejo. Passengers left the train at the latter point and were carried down the bay to San Francisco on the steamer "*Yosemite*." In 1878 a ferry line was established to carry passengers from South Vallejo to Vallejo Junction and the journey was continued by rail to Oakland. In 1879 a line was run to Benicia and the famous train ferry "*Solano*" was put in service between Benicia and Port Costa. On November 1, 1930, this ferry line was discontinued when the new Martinez-Benicia bridge was formally opened.

The Train Ferry "Solano" as it Appeared in 1879 Shortly After Being Placed in Service Between Benicia and Port Costa

engines, each of 1500 horse-power, propelled the *"Solano"* by means of paddle wheels thirty feet in diameter. The steering apparatus was hydraulically operated so that one man had no difficulty in holding the boat to its course, even against the tides of the bay.

For 51 years the *"Solano"* plied back and forth between Benicia and Port Costa, and made its last trip on November 1, 1930, the day the new bridge was dedicated. During that 51-year period, the number of days the *"Solano"* was out of service was negligible, and it operated without a serious accident, collision or personal injury. The same is true of its sister ship the *"Contra Costa,"* which was placed in service in 1914 and operated until the opening of the bridge. This is truly a remarkable record and speaks volumes, not only for the construction of the boats, but also for the efficiency of those in charge of their operation.

Between 1879 and 1930 the size and weight of freight and passenger cars increased greatly, but the *"Solano"* had been designed with an eye to future needs. At the time of retirement this famous ferry would still carry two modern locomotives and 36 freight cars, or two locomotives and 24 passenger cars, on its four-track deck.

By the year 1900 the traffic over this line had increased to such an extent that the Company considered the building of a low-level bridge, constructed on wooden piles, with a steel swing span to clear the ship channel. This plan was presented to the Secretary of War, but was refused on the ground that such construction would obstruct the bay. In refusing, the Secretary intimated that a bridge of a different character would have his approval, but the existing traffic did not justify the more expensive

A View of the "Solano" Taken Shortly Before it was Retired, After Fifty-one Years of Almost Constant Service

The "Overland Limited" Gathers Itself Together After Train Transfer Across Carquinez Straits via the Largest Train Ferry in the World. Train Transfer Between Benecia-Port Costa was Abandoned After Opening of the Martinez-Benecia Rail Bridge.

construction.

The train ferries, therefore, continued to operate under an ever-increasing burden until 1927, during which year they carried 98,262 passenger cars and 148,130 freight cars. This represented the full capacity of the boats and much freight had to be routed over long distances because the boats could not handle any more traffic.

To continue the train ferry, it would have been necessary to retire the two boats then in operation and substitute three new boats, obviously an expensive undertaking. The alternative was to build a double-track bridge to displace the ferry service.

The "Contra Costa," the Largest Train Ferry in the World, Placed in Service Between Benicia and Port Costa in 1914

A number of factors served to justify the construction of the bridge, although its cost was estimated at $12,000,000, or three times the cost of replacing the ferries. Breaking up a long train into sections and running them onto the ferry, then reassembling them once more, was at best a cumbersome and dangerous practice. The *"Solano"* and the *"Contra Costa"* were the only boats of their kind in existence, and the disabling of even one of them for a few days meant serious interruption to traffic and consequent loss of revenue and prestige.

Courtesy Ed Cheetham

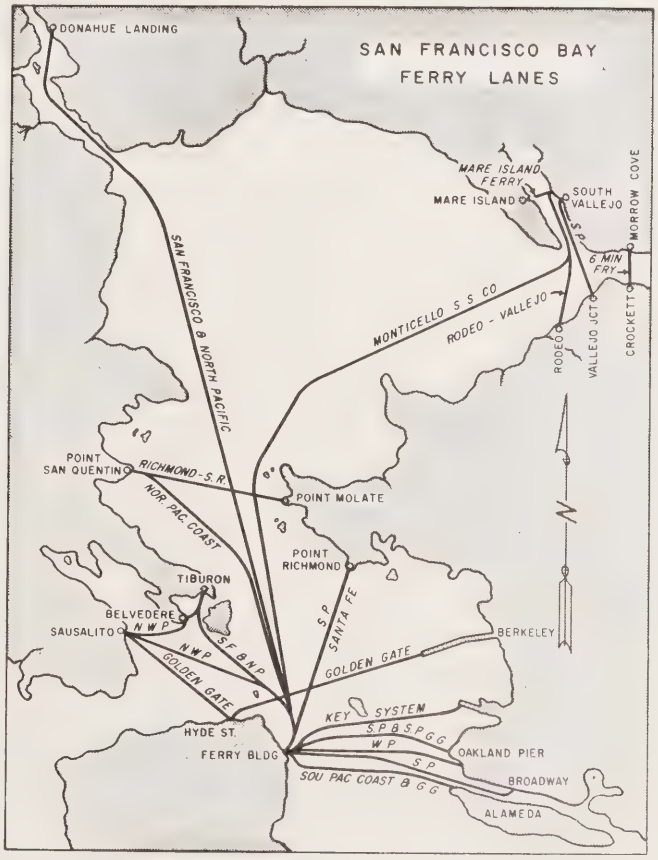
The Famous San Francisco Ferry Building Stands Watch over the "Alameda" as She Moves up to the Ferry Slip While the "Fresno" and "Lake Tahoe" Head Back Across San Francisco Bay After Passing Under the San Francisco-Oakland Bay Bridge.

A Bridge of White Ferry Boats Carry Passengers Across the Bay Before Construction of the Bridges. The "Alameda" Prepares to Dock her Passengers at the Ferry Building while the "Piedmont" Paddles Back Toward the Eastbay.

San Francisco Bound Passengers on all Overland, Shasta and San Joaquin Valley Routes Reached Rails End at the Oakland Mole, a Great Wooden Train Shed. Transfer was Made to a Waddling Ferry Boat for the Trip Across San Francisco Bay to the Famed Ferry Building.

Central Pacific Took Over Systematic Ferrying Between Oakland and San Francisco during the 1860's to Meet all Trains. As San Francisco Reached Saturation, Many Moved to Roomy Eastbay and Ferry Commuter Service was Established. Competing Lines were Absorbed Until Southern Pacific had 43 Double Enders Crossing the Bay to Make the Largest Ferry Operation in the World.

Patronage on all Ferry Lines Dropped After Completion of the Golden Gate and San Francisco-Oakland Bay Bridges. Ferry Commuter Operations Made Their Last Runs During 1939, However Three Ferries Remained in Service to Connect with Main Line Steam Trains. During 1958 the Last of the Great White Fleet Pulled into the San Francisco Ferry Building to Close an Era of the Southern Pacific's Steam Navy.



In June, 1936, the Southern Pacific ordered 12 single-expansion articulated locomotives from the Baldwin Locomotive Works. In December, 14 more locomotives were added, making a total of 26.

The design was similar to those in previous orders, the main difference being that the new engines had General Steel Casting's engine beds of cast steel for the front and back units, replacing the bar frames used on the previous locomotives. The beds include integral cylinders, cylinder saddles, crossties, valve motion bearers, etc.

The four high-pressure cylinders each measured 24″ x 32″ and the driving wheels were 63½″ in outside diameter. The boiler, 94″ in diameter, was practically identical with the boilers of the locomotives built in 1930. The steam pressure was 250 pounds per square inch and superheating surface 2,601 square feet. The grate area was 139 square feet, giving a ratio to the heating surface of 1 to 46.5.

An estimate of the weight of the locomotives was approximately 260 tons on the driving wheels, 321 tons for the total engine weight, and about 500 tons for the engine and tender combined. The rated tractive force was 123,400 pounds, figured at 85 per cent of the boiler pressure.

The tenders of the new design had rectangular tanks holding 22,000 gallons of water, an increase of almost 6,000 gallons over the capacity of the previous tenders. The fuel capacity was 6,400 gallons compared with the former figure of 4,662 gallons.

The first 12 locomotives were assigned road numbers 4151 to 4162, inclusive. The remaining 14 received numbers 4163 to 4176, inclusive. With delivery of the 26 locomotives, the Southern Pacific had a total of 77 locomotives of this type.

Cab-in-Front No. 4152 rolls Downgrade and Rounds a Curve on the Beautiful Cascade Line of Northern California. This Scene Symbolizes the Twilight of Steam in its Closing Years on This Great Western Carrier.

During the depression years, while business remained in a slump and traffic revenues continued on the downgrade, the Southern Pacific embarked on plans to restore passenger travel through the operation of modern, comfortable, high-speed streamlined trains.

The *Daylight* was the first train to be rejuvenated with announcement that streamlined cars and specially designed new streamlined locomotives were to be ordered. Designing of a suitable locomotive, powerful, yet with graceful lines was done by the office of George McCormick, General Superintendent of Motive Power. The result of research, planning and designing was a new 4-8-4 type, class GS-2, and road numbered 4410 to 4415, inclusive. These streamlined locomotives built by the Lima Locomotive Works were capable of a maximum speed of 106 miles per hour, although as a practical matter of operation, their train speeds were limited to around 75 miles per hour.

These new locomotives were basically the same as the first 4-8-4 type locomotives built by the Baldwin Locomotive Works in 1930 as the GS class. The advanced features included skyline casing, which also acted as a smoke lifter, and the streamlined skirting which blended in with the cab and pilot. The locomotive and tender were painted in black, red and orange with aluminum lines between

Pacific Railway Journal

Donald Duke

Daylight

Southern Pacific was Proud to Present the Streamlined "Coast Daylight", the Newest and Most Beautiful Train in the West. Speeding over the Famous Coast Line Between Los Angeles and San Francisco, the Colorful Red and Orange "Daylight" was as vivid as California's Setting Sun. Two Complete Trains were Built to Provide Daily Service and No Expense was Spared to Make Them the Most Imposing Trains to Roll on Flanged Wheels.

The "Daylight" Bound for San Francisco Climbs Between the Chatsworth Rocks after Passing Neat, Green Orange Groves on the Outskirts of Los Angeles. (ABOVE) The "Lark" Guided by a Daylight Type 4-8-4 Rolls Across the Picturesque San Fernando Valley and 9:00 AM Arrival at Los Angeles Union Station.

Courtesy Southern Pacific

the colors. The headlights were built into the smokebox door, the classification lamps were bullet-type, and the streamlined pilots formed a pleasing continuation of the skirting with the rectangular tender forming a continuation of the locomotive.

The two beautiful *Daylight* streamliners were placed in service March 21, 1937, between Los Angeles and San Francisco on a 9¾-hour schedule. Less than five months later, the 100,000th passenger had been carried to give the twin *Daylights* an American record for travel on a single section train.

On September 19, 1937, the streamlined *Hustler* and *Sunbeam* of similar design to the *Daylight* were placed in service between Houston and Dallas, Texas. Another new steam-powered train, the 8-car Pullman *Forty-Niner* was added July 8, 1937, on a 49-hour schedule between San Francisco and Chicago, staggering the five round trips a month with those of the all new 11-car diesel-powered *City of San Francisco*, first all diesel streamliner operated by the Southern Pacific.

Fourteen additional GS type streamlined locomotives were delivered by the Lima Locomotive Works in 1937, road numbered 4416 to 4429, inclusive. Classed GS-3, these locomotives were basically the same, however carried 280 pounds of steam in place of the 250 pounds of the GS-2 class.

In 1939, the Southern Pacific received twelve coal-burning 2-8-8-4 articulated passenger and freight locomotives from the Lima Locomotive Works. Without extensive application of extra sheathing, the locomotives had a clean and pleasing semi-streamlined appearance by the use of the skyline casing over the top of the boiler and by a decorative reinforced steel-plated pilot. These locomotives were placed in service between El Paso, Texas and Tucumcari, New Mexico, a distance of 332 mile of mountain grades reaching maximum elevations of 6,724 feet. The locomotives were of conventional design with cab behind the boiler.

Pacific Railway Journal

Streamlined and Beautiful Beyond Description, the All-Pullman "Lark" Travels Every Night Between San Francisco-Oakland and Los Angeles via the Coast Line. In Smart Tones of Gray the "Lark" Presents a Contrast Behind the Orange and Red Daylight Type Locomotive. (RIGHT) The "Coast Daylight" Became so Popular That a "Noon Daylight" was Inaugurated and is Shown Descending Santa Susana Grade and a Run to Oxnard for the 113-mile Trip Along the Shores of the Blue Pacific. (PAGE LEFT) One of the Twelve Coal-Burning Streamlined 2-8-8-4 Type Locomotives Working Steam as it Pulls Away from Alamogordo, New Mexico, enroute to Tucumcari and Interchange with the Rock Island.

Pacific Railway Journal

A low grade bituminous coal from the Dawson field in New Mexico was used. The locomotive had a total weight of 689,000 pounds of which 77 per cent was on the drivers, and developed a rated tractive force of 124,300 pounds.

Twenty additional 4-8-4 type locomotives road numbered 4430 to 4459 came from the Lima Locomotive Works during 1941 and 1942. Classed as GS-4 except for 4458 and 4459, these were the first with double headlights built into the smokebox, one fixed and the other oscillating. With smaller diameter cylinders and steam pressure increased to 300 pounds, this class had higher tractive effort. Numbers 4458 and 4459 came with roller bearings on the drive wheel axles, the 4458 with Timken roller bearing and the 4459 with SKF. Each of these two locomotives were classed as GS-5.

On December 7, 1941, total war came to the railroads of the United States. The impact on the Southern Pacific was probably greater than on any other railroad because of its strategic location on the Pacific Coast, the springboard of America's offensive in the Pacific.

With the coming of war, the Southern Pacific faced tremendous operating problems, one which was the immediate need for additional locomotives to move and move quickly the freight tonnage so vital to the nation's industries. Fortunately, George McCormick, General Superintendent of Motive Power, had foreseen the contingencies of this emergency and in March, 1941, placed an order with the Baldwin Locomotive Works for 40 heavy duty 4-8-8-2 single expansion articulated locomotives, duplicates of the most powerful engines on the Southern Pacific. Construction work was immediately stepped up, the first locomotive leaving the Baldwin Works in January to be followed by additional engines at three or four day intervals. Fifty additional duplicates were placed on order with the Baldwin Works during the balance of the war years. With the completion of these orders, the Southern Pacific added 195 new locomotives of this design within a space of 16 years.

Cab-in-Front Freight Extra Nears Walnut, California, with Snow Covered Mount Baldy Resting in the Background. (LEFT) The "Coast Daylight" Rounds a Typical Grove of California Orange Trees.

Donald Duke

Courtesy Robert Hale

As Night Drapes a Dark Cloth over Los Angeles Union Station the Busy Terminal Prepares for Departure of the Night Mail Train. Note the Interesting Light Pattern Set by a Scurrying Mail Cart. (TOP LEFT) Oakland Bound "San Joaquin Daylight" Behind a 4-8-4 Type of Older Design Built During World War II Charges Solidad Canyon With the Red and Orange Train. (PAGE RIGHT) Denuded of Colorful Red and Orange Livery, Fancy Skirting and Striping, the Black and Silver Daylight Type Locomotive is Caught Working Train No. 72 the Coast Mail as it Pulls Through a Brace of Guarding Semaphores.

Donald Duke

Donald Duke

The Shasta Route was Completed and Placed in Operation During 1887. Forty Years Later a New by-pass was Constructed Between Eugene, Oregon, and Black Butte, California, Over the Cascade Range Joining the Original Route at These Points. The New Cascade Line of the Shasta Route was 23 Miles Shorter and the Grade Much Easier. The Aroma of Pines, Fresh Water and Oil Smoke from a Cab-in-Front Blend to Make this Scene to the Left Most Characteristic of the New Cascade Line. (ABOVE) The "Owl", a Night Train Between San Francisco-Oakland and Los Angeles, Steams out of Solidad Canyon and Early Morning Arrival in Los Angeles.

During 1942, the Southern Pacific ordered 14 additional GS type locomotives from the Lima Locomotive Works. Ten of these were delivered to the Southern Pacific and four were awarded to the Western Pacific because of the war need. Classed as GS-6, they arrived during the summer of 1943, and while they had somewhat less tractive effort than the former GS locomotives, their performance greatly aided the war effort.

In the immediate postwar period, the physical properties of the Southern Pacific, worn by the heavy traffic of five war years, needed replacement and modernization. The rebuilding of the railroad was costly, prices were inflated and materials scarce.

Dieselization was the revolutionary improvement that brought greatest changes to the Southern Pacific. New efficiencies were effected, new facilities were built and the diesel progressively took over operations.

Donald Duke

Pacific Railway Journal

Old No. 9 Switches a Train of Talc at Oweyno with This Vintage Coach as Caboose. (TOP RIGHT) Lights and Shadows Across the Floor of Owens Valley as No. 22 Rolls Through Sand and Sage near Oweyno. (BELOW) Bound for Laws No. 8 Races a Snow Storm Blowing off Towering Mt. Whitney. (RIGHT PAGE) Dolomite Spur and Narrow Gauge Activity Beside the Purple Parched Inyo Mountains. Talc Loaded Here was the Last Remaining Cargo for the Aging Narrow Gauge.

Donald Duke

The Narrow Gauge

...ran-ended nowhere

The Keeler Branch of Southern Pacific was the Last Common Carrier Narrow Gauge West of the Rocky Mountains. For 70 Rail Miles This Vestige of the Old Carson & Colorado Followed Along the East Side of Owens Valley Between Keeler and Laws. Shadowed on the West by Mt. Whitney, Highest Peak in the USA and on the East by Death Valley, Lowest and Hottest Spot.

Donald Duke

In the Grand Manner of Steam Railroading the Operator Hands the Train Order Hoop to Waiting Engineman at Burbank Junction Where the Coast Line and San Joaquin Valley Line Part Company. (LEFT) Decked in Striking Red and Orange Livery the "Coast Daylight" departs Los Angeles Union Station under a Blanket of Southern California Fog.

Pacific Railway Journal

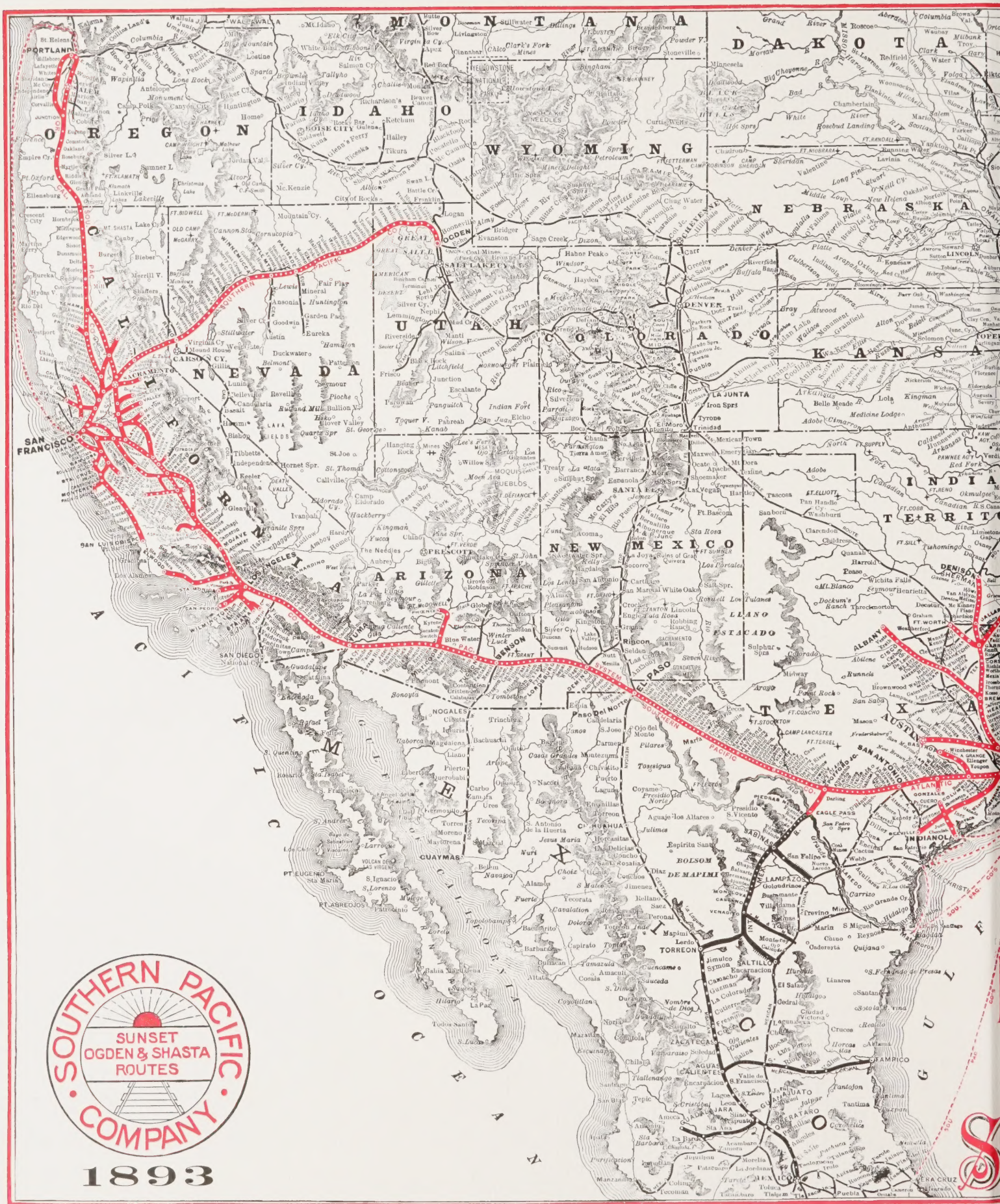
The number of operating locomotives diminished and by mid 1955, the Southern Pacific had more than 1,600 diesel units in service. At this time the diesels powered 86 per cent of passenger train miles and 91 per cent of the freight volume. Complete dieselization of the Southern Pacific soon followed in 1958.

When Mathias W. Baldwin's first locomotive, Old Ironsides, made its historic trial trip on the Philadelphia, Germantown & Norristown Railroad on November 23, 1832, undoubtedly there were many present who believed that steam transportation would never be a success. Nevertheless the railroads and the Southern Pacific continued to forge ahead, new ideas were developed in the Southern Pacific's own shops and side by side the locomotive builders continued to keep pace with the demands for more powerful and efficient steam locomotives. The last steam locomotive purchased by the Southern Pacific was road number 4294, one of the unique cab-forward type built by the Baldwin Locomotive Works. Today she stands with the *C. P. Huntington* on permanent display at Sacramento's Railroad Park. Southern Pacific — once owner of the Nation's largest fleet of steam locomotives turned its last iron horse to pasture as a monument to the age when steam ruled the rails.

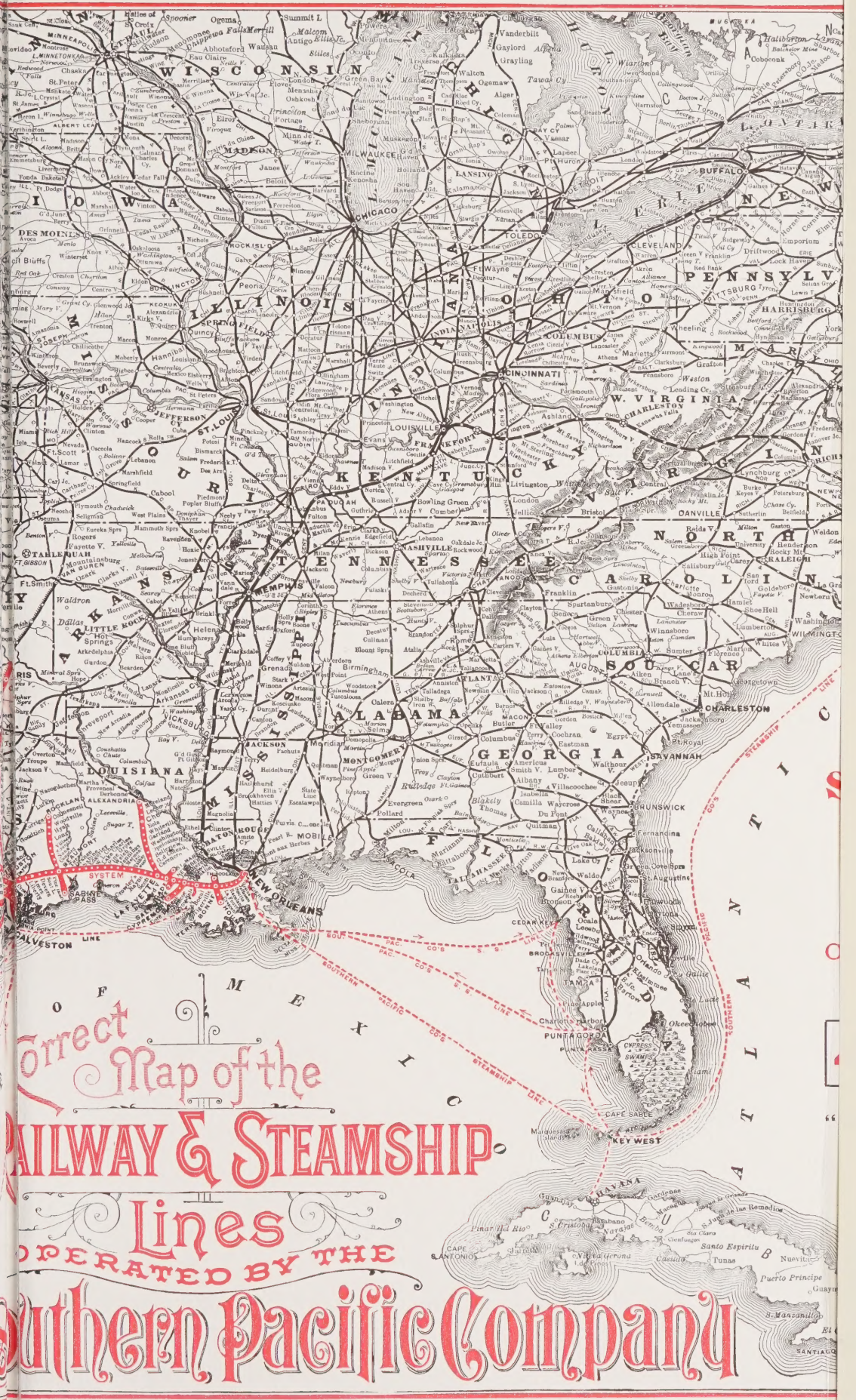
A Billowing Pictorial Pagent of Southern Pacific Railroading in the Waning Years of Steam Locomotion.

Donald Duke

LOCAL AND THROUGH TICKET OFFICE



LOCAL AND THROUGH TICKET OFFICE



Steam locomotives of the Southern Pacific were big, unique and different. Motive power consisted of every size, shape and wheel classification to ride the American rails.

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